SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

THE SHROPSHIRE COAL FIELD, AND ITS EASTERN ESTUARY—No. III.

Sir,—Whilst the new Kemberton pits are stripping the great east fault along the line of this ancient estuary, the men of one of the adjoining Halesfield pits are doing the same thing with the Clod coal, some 60 yards lower down, and from 500 to 600 yards nearer to the trough of the estuary. The Kemberton pits struck the great east fault at the shaft; they came down upon the Top coal at a point where it was partially denuded; and now the men in the adjoining pit are getting the Randle and Clod coals—two of the lowest workable coals of the series, 60 yards or so lower down, and some 500 yards further out to the south-east.

The Clod coal is here the lowest coal of the series, excepting the Flint coal, some 10 yards below, which is only 32 inches thick, and the coals intermediate between these and the Top coal, the highest of the series in this field, terminate in succession on a line which, if drawn from the termination of the two extreme measures, where they are denuded, would give a slope of about 1 in 8, which slope would represent the shore or coast line of the estuary. This is a greater inclination than Mr. Scott gives, which is 1 in 11½, and very much more than that he found between the same coals still further to the west, which was 1 in 44¾. The greater inclination south-east shows that we are there nearer to the trough of the valley, the boundary line of which runs north-east and south-west. If this had been a simple fracture, or an ordinary slip fault, similar either to the limestone or Lightmoor one, which traverse the same field, there would have been some ground for the common belief that the measures may again come in in the east; but arising, as it does, from the wasting effects of a body of water, which can be traced by its destructive effects many miles south, there appears to be a very poor prospect indeed of workable coals being found at any point in the direction alluded to.

Take a geological map, on which the coal fields of Salop and Staffordshire are laid down, and one will be struck with the similarity of the appearances they present as they face each other; and, taking into consideration the facts we have laid before him, he can scarcely fail to come to the conclusion that a great slice has been taken out from between them by the means described. The great gap made is equal to the two coal fields put together, and the question as to the period at which it was made is an important and interesting one. The great hollows made have, it is evident, been filled up by Permian, Bunter, and Keuper sandstones; but the evidence on the Shropshire side goes to show that the wasting effects witnessed are principally due to causes in action prior to the periods of either of these depositions. Take, for instance, the strata above the Top coal, which was found partially denuded in the shaft at a depth of 253 yards, and we shall find no difficulty in recognising the greater portion of them as coal measure rocks. They are as follow:—

	Yds.	ft.	in.
Top coal	1	0	6
Bass	0	1	0
Strong blue binds	6	2	4
Calamincar bass bottom	5	0	0
Light strong binds	4	0	0
Calamincar	3	2	0
Rough rock (with tar)	5	0	0
Partin	0	2	0
Strong calamincar	1	1	0
Rock, various colours	3	0	0
Strong calamincar	2	0	0
Light stoney ground	2	0	0
Bat	0	0	3
Foot coal	0	1	0
Bat or pricking	0	0	3
Bass	0	1	0
Strong blue binds	6	2	4
Calamincar bass bottom	5	0	0
Light strong binds	4	0	0
Calamincar	3	2	0
Rough rock (with tar)	5	0	0
Partin	0	2	0
Strong calamincar	1	1	0
Rock, different colours	3	0	0
Strong calamincar	2	0	0
Light strong ground	2	0	0
Coal	0	2	4
Dark clod binds	5	1	6
Espley rock	6	0	0
Light rock	12	1	0
Dark blue binds	4	0	0
Dark clunch	0	2	6
Coal	0	1	0
Dark clunch	0	2	6
Coal partin	0	0	2
Light rock	5	0	0
Dark streaky rock	5	2	0
Dark binds	2	0	0
Light binds	1	2	0
Light cluch	0	1	0
Light binds	1	2	0
Light clunch	0	1	0
Light rock	2	0	0
Light stony binds	5	0	0
Blue clod	1	2	0
Calamincar	1	1	0
Light rock binds	1	0	0
Calamincar	1	0	0
Light stony clunch	1	0	0
Dark ditto	3	1	0
Coal	0	1	0
Dark clunch	3	1	0
Light rock	31	0	0
Calamincar, strong	2	2	0
Light rock binds	8	0	0
Red ground	0	2	8
Light stony binds	2	1	0
Red ground	3	2	0
Light strong binds	2	0	0
Red ground	4	2	0
Streaky height binds	2	0	0
Red ground	4	2	0
Streaky height binds	4	1	0
Light-blue binds	3	0	0
Calamincar	5	0	0
Blue clod	1	0	0
Rock binds, blue	1	2	0
Blue clod	2	0	0
Dark slums or pricking	0	2	0
Coal	0	0	4
Blue clod, with clunch	3	2	0
White rock, with brass bottom	2	0	0
Streaky red binds, with blue	2	0	0
Red mingled yellow	3	0	0
Red mingled clod	2	2	0
Red Husey ground	7	0	0
Calamincar	3	1	0
Red ground	7	0	0
White rock	10	0	0
Husey rock, dark	1	0	0
Calamincar	3	2	0
Dark red ground	3	2	0
Light strong rock	0	0	6
Red ground	2	1	0
Red rock binds	2	1	0
Red ground	2	0	0
Grisled rock	0	2	6
Red ground	10	1	0
Hard light rock	4	2	0
Red rock	2	2	0
Clay partin	0	2	0
Red rock	2	1	3
Red marl	2	0	0
Rocky ground	2	0	0
Strong clay	3	1	0
Soil	0	0	9

Although these upper rocks differ so widely from the more productive group of lower coal measures, there is no difficulty in recognising them as a younger series, reconstituted out of the ruins of the older strata. The only questions are whether the upper red and purple rocks and marls are to be considered as belonging to the true coal measures, or whether they are mere attenuations of the Permians, and whether the lower members of the younger series might not be identical with those in which the Fungus and Upper Pennystone of the Lilleshall and Wombridge districts are found. If so, there is hope that the same important coal may be found extending farther east beneath the overlying red rocks than has been anticipated. It must be borne in mind, however, that all sinkings on the south-east side of the fault have hitherto proved unsuccessful. Imperfect upper coal measures have been found, but no workable seams have been discovered. In proof, we append reports of sinking and borings by Mr. H. Beckett, F.G.S., of Wolverhampton, sent to us by a gentleman connected with the Coal Commission, as tending to confirm the views we had expressed in the *Mining Journal* on this subject, and as corresponding with sections we gave in support of our views.

The Arley and Shatterford districts are in many parts dotted over with shafts, where the thin coals have, at various periods, been partially worked, in a very primitive fashion, when lying near the surface. Some of these workings I have occasionally examined, but found little encouragement for speculation, owing to the inferior quality of the coals. Some years back, Mr. King, of Amblecote, proved a thin coal at Compton, not far from High Trees estate; it was sulphurous, and not worth getting. Lord Stamford's recent trials in the same neighbourhood also proved a failure, though such coal as would have served for working engines is a desideratum with his lordship. About 15 years ago, on the estate of the Arley Pottery and Fire-brick Company, at a carefully-selected spot at Shatterford, a thorough test of this field was made. The site is 476 ft. above the level of the Severn Valley Railway, at Eymoor, and about 510 feet above the ordinary level of the Severn.

	Yds.	ft.	in.
Soil	0	1	0
Clay	1	2	0
Rock binds	1	2	0
Blue binds	5	0	0
Coal	0	1	2
Mottled red ground	9	1	9
Ditto rather lighter	4	0	0
Light clayey ground	3	0	6
Mottled pink ground	7	0	6
Mottled yellow ground	4	0	0
Coarse fire-clay	3	0	0
Blue binds	1	1	6
Thin coal	0	0	2
Dark blue binds	1	0	0
Light blue	12	0	0
Dark shale	0	1	6
Coal	0	1	7
Inferior fire-clay	1	1	6
Blue binds	6	0	0
Light rock	16	1	6
Coal	0	1	0
Blue binds	8	0	0
Coal	0	0	6
Fire-clay	0	0	6
Coal	0	0	6
Brownish white rock	28	1	6
Conglomerate	2	0	0
White rock binds	6	0	0
Limestone balls	0	1	0
Soft shale	1	2	0
Red & yellow mottled ground	4	0	0
Ditto ditto	7	1	6
Blue binds	4	1	6
Nodules of argillaceous limestone	0	0	3
Coal	0	1	8
Fire-clay	1	0	0
Dark binds	5	0	0
Ditto	12	0	0
Brown rock	0	1	6
Dark binds	6	0	0
Shale	1	0	0
Roof coal	0	0	9
Holing shale	0	1	6
Birch coal	0	2	8
Fire-clay	1	2	0
Mottled ground, with nodules of ironstone	3	0	0
Strong grey rock	4	0	0
Hard conglomerate rock	2	0	0
Mottled ground	2	2	6
Stony grey conglomerate	2	0	0
Red, blue, and green mottled ground	2	0	0
Stony blue gritty rock	2	2	0
Rock binds	1	6	0
Mottled ground	0	1	6
Grey rock	3	2	0
Strong mottled ground	2	2	0
Mild bluish rock	0	2	6
Blue and red binds	0	1	0
Mild blue rocks	0	2	6
Strong mottled ground	1	0	0
Blue and red rock	1	0	6
Red marl	0	0	6
Blue rock binds	0	1	0
Strong red binds and red and grey rock	1	2	0
Strong blue rock	0	2	0
Red and blue binds	0	2	0
Red and green marly ground	0	1	0
Strong lt.-blue limestone rock	1	0	0
Red and blue binds	0	2	4
Red and green parting	0	0	8
Light mottled ground and strong blue rock	2	0	0
Red and green rock	1	2	6
Blue and grey rock	0	2	0
Red and blue binds	0	1	6
Ditto	1	1	0
Red, blue, and strong white mottled ground	1	0	6
Strong grey rock	0	1	6
Red and blue and brown and blue mottled ground	2	2	0
Light-coloured marl	5	2	0
Red and blue rock	1	1	0
Blue and red rocky marl	4	0	0
Red rock	0	2	0
Blue rock	2	1	0
Strong red and blue ground	4	2	0
Blue rock, mingled with red at top	1	2	0
Blue binds	1	0	0
Coarse conglomeritic rock	5	0	0
Green and brown rock	0	1	6
Blue and red ground	1	1	0
Bastard fire-clay	1	2	0
Red and blue rock	1	0	6
Strong blue rock	3	1	0
Red and blue rock	1	2	6
Blue and red rock bines	2	0	0
Grey conglomeratic rocks, or rather brecciated, made up of variously-sized angular fragments of green and purple Cambrian rocks	7	0	0
Blacker pink ground	0	1	8
Coarse fire-clay	1	1	0
Red and blue rocky ground	2	2	4
Blue and red ditto	1	2	0
Coarse fire-clay	0	2	0
Blue, red, and dark shaly ground	1	0	6
Blue rock	1	0	6
Red and pink rock	0	1	6
Blue rock and dark binds	2	0	0
Dark shaly binds, with plant impressions	0	1	6
Grey rock	1	1	6
Dark binds	1	2	0
Hard light rocks	1	0	0
Blue and red rock	1	1	0
Red and blue mottled ground	1	2	0
Strong red and blue ground	1	0	0
Light-coloured shale	0	2	0
Dark-coloured ditto	0	2	0
Strong common fire-clay	0	2	0
Dark rock	0	2	6
Dark grey and blue rock, mingled with bits of coal	1	2	0
Coarse rock	0	0	6
Conglomerate	2	2	0
Rock, mingled with bk. shale	1	1	6
Light-coloured fire-clay	1	0	6
Brown and red coarse rock	2	1	0
Red and blue ground	3	0	6
Blue rock	1	0	3
Black bat	0	0	9
Fire clay, with ironstone nodules	2	0	6
Hard mottled ground	3	1	0
Dark yellow marl	6	2	0
Dark red marl	0	2	6
Fire-clay, good quality	1	0	0
Dark fire-clay rock	0	1	0
Dark red and blue rock	0	2	0
Strong grey rock	5	0	0
Blue binds	0	2	0
Dark gritty and shaly rock	2	1	0
Dark and red binds	2	0	0
Fire-clay, good quality	1	1	0
Mottled rock	1	1	6
Common fire-clay & black bat	0	2	6
Grey rock, mingled with coal smutts	8	1	0
Binds and shale	0	1	0
Brown, blue, and grey rock, with smutty streaks	1	2	6
Dark binds	2	2	6
Dark blue and brown rock	0	0	6
Blue and red ground	1	1	6
Grey and red ditto	1	2	0
Green and pink marl	0	2	0
Black and red marl	1	2	0
Red rocky ground	7	1	6
Grey rock	0	2	0
Red and blue ground	1	1	0
Fire-clay, good quality	1	1	0
Ditto, stained with red and yellow	1	0	0
Dark binds	0	1	0
Hard brown fire-clay rock	0	1	4
Red, blue, and grey rock	0	2	8
Grey and dark shaly rock, with fossil plants	3	0	8
Dark binds, with bat	0	1	2
Batty long-grained coal	0	0	2
Strong rocky fire-clay	0	2	0
Strong rock, mingled with fire-clay	1	0	6
Strong gritty	4	0	6
Dark binds	1	0	4
Bat, with shades of coal	0	0	8
Dark-brown rock	0	2	6
Blue and red	0	2	6
Grey and gritty shaly rock	0	4	0
Dark binds	0	2	6
Blue and red rock	1	1	0
Mottled ground	0	0	6
Dark binds	0	0	6
Dark-brown rock	0	1	6
Blue and red rocky ground	1	2	0
Dark grey shaly rock	2	1	6
Dark binds	0	0	10
Coal, good quality	0	0	8
Dark fire-clay rock	1	1	4
Light-coloured sandstone, coarse and gritty	11	1	0
Strong blue binds	0	1	0
Dark binds, with ironstone nodules	0	2	0
Bat and coal	0	0	6
Fire-clay rock	1	0	0
Grey and brown rock	1	2	9
Shaded rock	0	0	6
Grey and brown rock	1	2	6
Blue rock binds & dark binds	1	0	6
Black bat	0	2	3
Coal, good quality	0	1	1
Strong fire-clay rock	0	0	6
Hard gritty rock (like limestone grit)	0	2	6
Dark gritty rock	0	1	2
Blue binds	3	0	0
Blue and red ground	0	1	0
Dark fire-clay clod	1	0	7
Hard, light-blue, & grey rock	1	2	8
Black bat, dark clod, and rock binds	1	1	6
Bat 4 in., coal 4 in., bat 4 in.	0	1	0
Fire-clay	1	0	3
Blue and green rock	1	0	0
Red and mottled ground	0	1	0
Grey rock (boriugs)	1	0	6
Dark-blue rock binds	1	0	6
Dark fire-clay rock	1	0	0
Grey rock	1	0	0
Dark fire-clay	0	1	6
Dark grey rock	0	1	6
Blue rock binds	5	2	0
Dark fire-clay rock	1	0	0
Red and blue ground	5	1	0
Dark batty binds	1	0	0
Bluish-grey rock	3	1	6
Dark binds	0	0	6
Dark-grey rock	3	2	0
Basalt (entered)	9	1	0
Total	454	2	7

The last 35 yds. were bored. The strata above were sunk through, and were examined and tested by Mr. Roberts, then secretary of the London Geological Society, who was intimately acquainted with the district.

Madeley, Salop, June 16. J. Randall, F.G.S.

WORKING MEN'S AFFAIRS.

Sir,—Since my correspondence with you on this subject many things have arisen from time to time on which I wished to make some remark in the Journal, had I not been unable to find leisure now and then for that purpose. I will now proceed to notice some of these in the order in which they occur to me, rather than in that of the time of their appearance. The disturbances and loss of life at Mold are truly deplorable. Beyond the regret that the violence of a mob forced the soldiers called in to aid in keeping the peace to fire with ball in self-defence, lies the deeper feeling that a vindictive spirit of outrage has been roused, which is too likely in time to come to bear bitter fruit. The Welsh are generally, as workpeople, quiet and peaceable, but when under the influence of revenge or deep-rooted hatred, capable of excesses which those who have not seen this side of their character can form no idea of. Both magistrates, police, and military seem to have behaved as well as possible when the crisis of danger came, showing firmness mingled with much forbearance and humanity. But from the notices I have seen now and then of the way in which offences of discontented workmen, calling for a firm hand, have been dealt with by the magistrates, I fear there has been a want of that vigour in checking the first outbreak of disorder which spares much trouble, and avoids the necessity for that severity indispensable when the mischief has grown to a head. It never answers to treat offences against law as mere results of disputes between masters and men, until the workpeople get the idea, as they did at Sheffield, that crime and outrage lose their criminal character when viewed as necessary in defence of real or supposed right. As I have said in former letters, the leaders of Trades Unions have lamentably failed in their plain duty of denouncing and preventing all illegal violence amongst their members. Fairly balanced, the harm they have by this failure of duty inflicted upon the working class more than overbalances the direct advantage of their action in keeping up the rate of wages, and has sorely hindered the advance, otherwise sure, if not so speedy as all desired, in improving their position. To this hour the actors in the worst Sheffield outrages—convicted criminals on their own evidence—remain members of the Unions to which they belonged, instead of having been expelled with the ignominy they deserved. To this hour the central body of Trades Unions has remained content with general resolutions condemning the conduct of these Sheffield Unions, instead of insisting on such expulsion as the only plea for retaining any connection with such Unions, or forbearing to denounce them publicly as a scandal to the class to which they belong. Until this is done they too much resemble the footman in Sheridan's comedy, who said he scrupled not to lie for a friend, but it hurt his conscience to be found out. See what these foolish, misguided Welsh colliers have gained by their rioting: the works are closed, leaving them and their families to endure much privation and destitution, until the bitter lesson of suffering teaches them the error of their ways.

I was glad to see the matter of emigration for working men so practically handled by the Social Science meeting. The summary of the points to which the working men's committee direct attention in reporting upon the relative advantages of different countries for emigrants is fully sufficient and practical, and it was truly refreshing for those who, like myself, think Mr. George Potter's past action in Trades Union concerns more hurtful, on the whole, than beneficial to working men, to welcome his name as secretary to the committeee. Here he is doing good service, as far as I can see, in an able, sensible manner. The way in which this committee sets about its work might have been inspired by my letters in your pages, so nearly does their programme work out all I point out as the most important essentials to make emigation a complete success. If Mr. Potter will only take up the subjects I there recommended, in addition to this of improvement in dwellings, systematic education of the best, really good sound benefit societies, and enforcement of due care for workmen's lives and health, in all relative to their daily work, however they may be employed, with his great business tact and energy, he will earn the fame of doing more good to his class than most living men have the privilege of being able to achieve. What an unhoped-for saving of life there was in the awfully sudden inundation of Brierley Hill Colliery. This, under the blessing of Providence, is due to the excellence of the plant, and the ability and heroic energy of the manager, underviewer, and every man under them. Unless the pitwork had been every way first-rate it could not have been driven to between two and three times the usual number of strokes per minute without a breakdown, which would have sealed the fate of the poor fellows all strove so hard to save. Yet the engine was safely driven to the point where it could not have been further speeded without fairly churning the water; and this for hour after hour, till the tearing throb and clank and roar reached even the distant ears of the poor prisoners below, to the warning that all human effort could effect would be tried for their deliverance. And what brave endurance these poor fellows showed. Nothing but trust in their Maker could have kept them up, hoping against hope, and bearing up with strength slowly wasting by starvation, through long hours of darkness, when every minute seemed an age. The work of colliers cannot be hurtful to the vital stamina, or some would have broken down, worn out by famine, ere relief reached them. Yet all (save one who lost his senses, and drowned himself) were saved. It was, indeed, a great deliverance. The terrible explosions at Ferndale and a Wigan colliery left no room for such succour. The fiery death was speedy, and loss of life deplorable, leaving only corpses to be recovered.

I saw a sensible letter (either in the Times or your pages, I cannot at the moment recollect which) denouncing all working in places so full of gas that life depends upon no single spark being allowed to enter. Instead of ventilation merely to enable the collier to breathe, and reliance on safety-lamps, and working without powder, the gas should be drawn off so as to leave the workings as safe as any chamber. The attention of colliers' Unions should be given to this. In these days of continual inventive progress some means may surely be found of accomplishing this, and should be rigidly enforced by the Legislature in all instances when so discovered.

The working men of Paris are finding out by experience what the socialists can do for them. It is a healthy and encouraging sign of progress, and ground for hope in the future, to see them aiding the police to take rioters into custody. The time has been when they would have fought with them; but they have learned that disorder

and destruction of property, if they lead to liberty at all, lead only to the liberty of starvation. A MAN OF EXPERIENCE.

London, June 16.

FORCING OUT COAL BY HYDRAULIC POWER.

SIR,—In the Supplement to last week's Journal I notice an account you give of a trial at the North Staffordshire Iron and Coal Company's pits of an invention of Mr. P. Bidder, jun., for forcing out coal. I was very much struck in reading the description given of it as being identical with a wedge instrument invented by Mr. James Grafton Jones, of Blaina, as far back as 1867, and which, to my knowledge, was tried successfully in those collieries (which have stopped working). The drilling apparatus, also, was very similar to that given in your description.

I trust you will oblige by giving this insertion in next week's Journal, as I think it right that justice should be done to the original inventor of this important apparatus. J. GARDNER.

22, *Sion Hill, Clifton, June* 15.

THE MIDLAND COAL FIELD—No. I.

ON THE EXTENSION OF THE COAL MEASURES UNDER THE NEW RED SANDSTONE AND MAGNESIAN LIMESTONE FORMATION IN YORKSHIRE AND NOTTINGHAMSHIRE.

SIR,—The coal field in Yorkshire, so far as it has yet been explored on the eastern side, may be defined by a line running from Brerford to Kippax, Newton near Castleford, Denaby Main, and to Shireoaks Colliery, on the borders of Nottinghamshire. The same coal field is continuous into Derbyshire and Nottingham, being terminated by a large fault on the southern side; on the eastern side, in Derby and Nottinghamshire, the coal measures are proved by the sinkings at Staveley, the Portland Collieries, and by the pits at Annesley, Hucknall, Cinderhill, and the Newcastle pits, the four latter having passed through the magnesian limestone and lower new red sandstone, together usually called the Permian formation.

The collieries on the east side of Castleford have not yet penetrated the Permian formation, and at present work the upper series of coals on the west of its basset edge. At Denaby Main, 16 miles south from Castleford, two pits have been sunk through the lower new red sandstone, which is here of great thickness, and gave out large quantities of water in the process of sinking; a powerful engine, having two 40-inch horizontal cylinders, 6 feet stroke, was used, together with pumps of large diameter, for raising the water. The shafts were eventually sunk through the sandstone, and the water stopped back by cast-iron tubbing to the Barnsley seam at the depth of 450 yards, and 10 ft. thickness of coal was found. At Shireoaks, 12 miles south from Denaby Main, two pits are sunk through the Permian formation. The thickness of magnesian limestone is stated to be 50 yards, and the lower red sandstone 66 yards. There is 186 yards of tubbing in one pit, and 196 yards in the other. The pits were sunk to the Barnsley seam at the depth of 515 yards. At Cinderhill, 22 miles south from Shireoaks, three pits were sunk through magnesian limestone and lower red sandstone, together 16 yards in thickness, which are all tubbed or cased with cast-iron through that strata. The shafts are sunk to the Top-hard, or Barnsley seam, which proves here 5 feet 2 inches thick at the depth of 222 yards, and suitable for house and steam purposes. Two of the shafts have been extended deeper to the Deep-soft 3 feet 1 inch thick, at 382 yards, and to the Deep-hard 3 feet 3 inches thick, at 398 yards. Near the bottom of the Cinderhill pits a 70-yard fault is met with, throwing the strata up to the north. The coal was found again on the north side of it by driving a stone drift 730 yards long, and of the same quality of coal as on the other side; and the the thickness and quality of the Top-hard seam, as far as it has been proved, are understood to be not at all impaired. The Deep-soft and Deep-hard seams are not found so favourable as to thickness as they are at the collieries on the outside of the Permian formation. The Newcastle pits, two miles from Nottingham, are 136 yards deep to the Top-hard seam, the Kimberley pits 125 yards to the Top-hard, another pit raising coal from the Deep-soft and Deep-hard seams from the depth of 273 yards. These collieries, with Cinderhill, were under the proprietorship of the late Mr. T. North, and are capable of raising large quantities of coal. Hucknall Colliery and Annesley Colliery, further north, have also passed through the Permian formation, and the Top-hard seam is worked and raised from them of good quality and thickness. The Top-hard seam of Derbyshire and Nottinghamshire is identified with the Barnsley seam of Yorkshire; it is not distinctly traced to the Leeds district, but is probably the Stanley seam. The black shale of Derbyshire is the Silkstone seam of the Barnsley district, and the latter is identified with the Middleton seam, or Waterloo Main of the district of Leeds.

This great Midland coal field, extending over part of the three counties, has at present established upon it collieries, many of them on the most extensive scale, possessing large royalties, powerful machinery for raising coal from the pits, and for hauling underground, and abundant means of ventilation, principally by furnace power. The system of working coal is being improved upon, and the principle of extracting at once the whole of the coal, commonly called long wall work, and which is almost generally followed in the county of Derby, is gaining ground in the Yorkshire collieries. A Derbyshire overman says he can work any seam of coal by long wall, and to greater advantage, than by any method or modification of stall and pillar, which the Yorkshire people follow so persistently, provided he has hewers who understand, and are willing to carry out, the long wall system of working. There is some difficulty in fiery mines, it is admitted, with respect to ventilation in the waste or goaf of these mines, where sudden falls may cause eruptions of gas into the working face, but this can be counteracted in various ways by building walls and stowing the goaf, according to the conditions of each particular mine.

With respect to the extent of the hidden resources of this coal field, or that part of it overlaid by the lower new red sandstone, magnesian limestone, upper new red sandstone, and other formations, I cannot assign any limits to its extent in an eastern direction. Seeing that there is at Denaby Main the finest seam of coal in the Yorkshire field under the red sandstone; at Shireoaks, upwards of four miles east from the borders of the new red formation, coal of good quality is worked, but impaired in thickness, and is still being extended eastward in those pits, maintaining a uniformity in quality and thickness the whole way. And in the collieries situated in Nottinghamhamshire, I have stated these produce excellent coal, but the thickness of the seams is somewhat impaired. Taking these facts into consideration, there is no reason to doubt the extension of this coal field into Lincolnshire and to the eastern coast of England, having a slight dip in that direction, requiring pits of increasing depth as we proceed eastward. The great outlay required for the establishment of collieries in this quarter will, it is presumed, deter much speculation or adventures for the present, as the collieries already established are much more than equal to supply the demand for coal for many years to come.

The magnesian limestone is worked in quarries near Shireoaks, for making lime; it is also extensively worked at Kiveton Park, three miles westward, for the same purpose; it is not suitable for building stone. At Chapel Anston, two miles north from Kiveton Park, the magnesian limestone is still worked by Mr. Wright; the whole thickness is about 30 feet; the beds range 2 feet thick and a little under; at the bottom a stratum of bind occurs, and below that the lower new red sandstone. The whole of the village of Chapel Anston is built of magnesian limestone, also the church at St. John's, which is very ancient, and in a good state of preservation. The village of South Anston is built partly of magnesian limestone and partly of red sandstone; the latter is much more easily worked than the former, but not so durable.

The magnesian limestone, of which the new Houses of Parliament are built, was obtained from Chapel Anston, on the Duke of Leeds' property, adjoining the quarry now in operation, and similar as to the quality of stone obtained. The limestone is subject to veins of sand at intervals, called sand backs. The stone adjoining these, for the breadth of 1 ft. or more, is of inferior quality. It is stated, when the stone was sent to London, this inferior part was not separated from the other, but went altogether, which may account for some part of the stone having so soon shown signs of decay. Another cause assigned is, that in building the stone was not placed in the natural position as to its bed, but was sometimes placed on its edge, causing the bedded part to be outside. The limestone from these quarries is being sawn by machinery at Kiveton Park, two saws going; each cuts a block of stone into 18 slabs, of from 3 to 4 in. thick, which are used for flagging the interior of buildings.

The stone obtained at Steetley, near Shireoaks, is a limestone, extensively used for public buildings; it is said to be durable, and much easier to work than Anston stone, but has the quality of being porous, and absorbing moisture. ENGINEER.

GEOLOGICAL NOTES ON COAL—No. V.

SIR,—There is another thought inevitably suggested by a consideration of the stages through which the ancient forests must have passed before they could be transformed into modern fuel, and that is the long lapse of time required for every step in the cycle of changes. When we gaze at the stars in the heavenly arch, and endeavour to calculate their magnitudes and distances, we are overwhelmed with the vastness of space; but when we walk over the rocks, and reflect upon the various processes of their formation—when we think of that long course of deposition and consolidation, of uprising and depression, of cooling down and laying bare—we literally grow astonished at the immense breadth of time which has thus been travelled over. It is not in the power of any mortal man to tell when the first ancient forest lifted itself to the sky, and drank in the sunshine and the rain, and out of which the first coal bed was made. One geologist (M'Culloch) calculates that it must have taken not less than 200,000 years for the production of the Newcastle coal field, with all its rocky strata. He reaches that conclusion by observing the rate at which a certain Scotch lake deposits its sediment of mud or marl, and which he found to be at the rate of half a foot in 100 years. Supposing this calculation to be well founded, what is the Newcastle coal field in comparison with some other coal fields—say South Wales, the production of which must have required more than 3,000,000 years? All these calculations, of course, are mere conjectures; for man cannot compute the length of time which these geologic movements necessarily demand. They can only be measured by Him with whom 1000 years are but as a day. He employs ages upon ages for the gradual unfolding of his wonderous plans; and all our contemplations of time are baffled when viewed in relation to Him who is the mover and sustainer of the universe.

But there is another aspect to this subject on which we would dwell, and with which we fancy the majority of our readers have most sympathy: we mean the *practical aspect*—the *utilitarian view*. In taking up this side of our subject, we leave the speculative points we have been discussing; and instead of asking the *why* and *wherefore* of this, that and the other, we shall only consider what is useful and profitable. True, there is speculation here also, but it seldom turns out with barren results, excepting where people seek for coal where they have no geological right to expect it. We have already ascertained something of the history of this black diamond; we have got to know where it is located, the condition in which it is found, the chief elements of which it is composed, and we have obtained the means of bringing it to the surface. Yes! we have got the coal—that is no poetic conception, no romantic dream, but a plain, sober fact. What, then, are the uses to which it can be applied? We think before we have done our readers will say that the more appropriate question would be—What are the uses to which it is *not* applied? The school-boy knows that it gives heat and light. It maintains a genial warmth in our dwellings, and enables us to keep the cold out of our bones; our food is cooked by its agency, the garments we wear are woven by its means; the luxuries of other climates are brought to us with unerring certainty over the mighty deep by its power. We are carried by its agency over valleys and through mountains at a pace as if riding on a cannon ball; it illuminates our streets, shops, and houses with a brightness that takes away night from our civilisation; it sets in motion that wondrous machine, the printing press, by whose black letter symbols we learn something of the wisdom of the past and the science of the present. In fact, it would be difficult to tell all the benefits that come to us from this mineral treasure. From our own coal fields we obtain more than 100,000,000 tons annually, which quantity is three or four times larger than that raised from the rest of the coal fields the wide world over, and adding some 18,000,000*l.* or 20,000,000*l.* yearly to the wealth of the nation. In reference to the quantity of coals raised during the last few years, we may quote the following statistics, as given in the *Mining Journal*:—

The Mineral Statistics of the United Kingdom for 1866 are about to be issued. We have been favoured by Mr. Robert Hunt with a proof-sheet of the introduction, which we at once communicate to our readers.

COALS.—The regularly continued increase in the quantity of coals raised from the collieries of the United Kingdom is a remarkable feature of the year 1866. It must be remembered that the year was marked by great commercial disturbances, and that several kinds of manufacture, and that of iron especially, were suffering from a severe depression. Notwithstanding this, it has been ascertained that upwards of 100,000,000 tons of coal were produced. The rate of increase for the last few years being as follows:—

1863	Tons 88,292,515		
1864	92,787,873	Increase	4,495,358
1865	98,150,587		5,127,145
1866	101,630,543		3,479,956

The large quantity of coal raised in 1866 was obtained from 3188 collieries, and the great development of coal mining in this kingdom is shown by the fact that in 1856 there were but 2815 collieries in active operation. The increase in our exportation of coal was 782,631 tons; therefore, about 2,500,000 tons of coal will have been consumed in this country in excess of the previous year. Pursuing the desire to collect all possible information in answer to the question—"How is our coal used?" which was proposed in 1865, a series of detailed export tables were given in this publication, which cannot fail of being useful and interesting.

It must be obvious to everyone that coals differ much in quality, some being more bituminous than others, some being more suitable for one purpose than another. If our readers require a coal that will yield the greatest heat, then some would recommend the anthracite coal, as it contains the largest quantity of carbon. But others (and we are among the number) would rather recommend the use of caking coals, because they consume the largest quantity of oxygen from the air, and the intensity of the heat is proportionate to the quantity of oxygen consumed. But if you specially require a coal that will yield little or no smoke, then anthracite is the coal for you. English travellers, being accustomed to see dense volumes of smoke belching forth from the chimneys of manufacturing towns at home, are surprised, when they approach some of the manufacturing towns of America, to find the tall chimneys emitting no smoke, which, of course, is owing to the use of anthracite coal. Visitors to smoky towns like Sheffield would certainly carry away a different impression of their appearance from what they often do now if this coal were generally employed. True, it is extensively used in America and Wales for the iron manufacture and other purposes. But perhaps it would not suit the pockets—perhaps not answer the purposes—of our home manufacturers. If you want to secure a bright fire in your grate (and who does not?) then order either the best Newcastle or the best Welsh caking coal, for both these kinds contain the largest quantity of hydrogen, and it is from the combinations of hydrogen we get the bright blaze. The same coals will also highly commend themselves to the tidy housekeeper, who is always glad to get a coal which yields the smallest quantity of incombustible ash. The Yorkshire and Lancashire coals also have special recommendations of their own.

The Cumberland coals are admirable *as coals;* but if the reports of housekeepers in certain localities of the Cumberland coal field are to be believed, the ancient forests, out of which the coal beds in this district were formed, must have been thickly studded with stones, for many lumps are found which have the appearance of coal, but in reality are stones, and impregnated with a very small quantity of coaly matter. M. A. MOON, F.G.S.

[This series of papers on Coal are the substance of a Lecture delivered to an audience of working men, at Whitehaven; and are forwarded for publication in the Journal, in the hope that they may be of use for a similar purpose in other districts.]

THE STEAM-ENGINE—PRACTICE AND THEORY.

SIR,—If it were not for the injustice displayed, it would be amusing to watch the artful moves continually presenting themselves in connection with so-called inventions, or contemplated inventions—at one time upon the atmosphere as the condensing agent for steam-engines, at others upon other points, all of which have been matters well known in all countries in which the steam-engine is extensively used ever since 1849. Thus, we have fine-spun remarks upon the atmosphere as a condensing agent, as though it had not been in every-day practical work for eight years, and by that every-day practice made as much an accomplished part of steam engineering as the use of the Watt engine. The pith of the whole question can be given in a few lines. In 1840 the writer increased the cooling effect of the air twelve-fold by the motion in his condenser, and he diminished the heat required to produce the horse power from 8 to 1, or from 16 to 1. Thus he diminished the surface required in the atmospheric condenser from 192 square feet to 1 square foot for equal steam power, compared with what he found it in 1840. Then, in relation to water surface condensers, he reduced the surface required for equal power from 2½ square feet in 1840, to 3 square feet in 1849, and he ultimately, by 1857, had reduced it to 1½ square feet. Whilst he had increased by his boiler the weight of steam the pound of coal would produce from 7·27 lbs. to 13·56 lbs., and had his boilers been permitted to do so they would ere this have saved scores of human lives which have been sacrificed to boiler explosions.

Thus stands the matter in relation to steam generation, heat, surface, and power, with atmospheric and water surface condensers, and marine boilers, when employed upon the old basis and upon the new one. In conjunction with these new means it was that the writer harnessed the atmosphere in the work of reducing the steam to water to replenish the boiler, and in removing its own pressure from the exhaust side of the piston by the production of the vacuum. Thus nothing but injustice and prejudice have prevented men from seeing that the very element the writer found the great incubus, destroying so much of the power of the steam-engine, he converted into the most universalising agent to render the steam-engine the assistant of man in all places and under all circumstances, and even so far back as 1848 it was quite a common thing to get the steam up from cold water to 130 lbs. per square inch in five minutes, and retain it the day round, not varying above 6 or 8 lbs. in pressure.

Thus the whole elements of the question have long ago passed from the hands of theorists into that of eight years continued practice, with engines varying in power from 4 up to 40 horse power, and the whole question has been made as plain as a pack-saddle, so that there is not so much difficulty to be encountered by anyone in its application to all kinds of steam-engines as the farmer has to encounter in producing good crops from the land, for the reason that those eight years practice have as much settled all the scientific and practical points of the question as would 20 or 100 years, and now the engineer has this field to cultivate with perfect control of all the elements which enter into the question, but the farmer has all the uncertainty of climate against him. The surface, with air for condensation required in the condenser, with steam of 200 lbs. pressure properly employed, need not exceed 10 square feet per horse power, and only 10 lbs. weight, whereas the writer found the water surface condenser in 1840 required double this surface, or 20 square feet per horse power. Hence the lightest of all engines for equal power will be found to be Craddock's universal high-pressure expansive and condensing engine, for though they can suppress the name, the thing will exist when they, as well as its author, quit this state of being.—44, *Friston-street, Birmingham.* THOS. CRADDOCK.

[For remainder of Original Correspondence, see this day's Journal.]

MINING STATISTICS OF NOVA SCOTIA.

The report for 1868 of the Chief Commissioner of Mines for the Province of Nova Scotia has just been issued, and is of a very favourable character, Mr. ROBERT ROBERTSON being "enabled to report a states of progress which he cannot but think satisfactory." During the year there has been remarkable activity in prospecting and in opening new mines both in the old and new district. Eleven new crushers have been licensed, and there are six others in course of erection. Financially, the success has been more than was expected, the receipts being larger than in any previous year. Mining in the Stormont district continues to be somewhat limited, and the return of gold less than last year, which is accounted for by the Isaac's Harbour Company having stopped work, owing to the misfortune of their crusher being burnt in the early part of the season. The Mulgrave Company has been vigorously and successfully working. There have been some discoveries of alluvial gold on the shore at the mouth of the harbour, which promise to be profitable, and preparations are being made to wash on a large scale in the spring. At Seal Harbour a large amount of labour has been expended in prospecting for a lead, out of which a number of very rich boulders are supposed to have come, but as yet without success. At the head of Country Harbour a considerable amount of prospecting has been done, and a small crusher built. At Wine Harbour there has been an increase in the quantity of gold obtained. In the older parts of the district the ground was originally taken up in small lots; these have lately been purchased, and united into large areas, and preparations are now being made to mine on a large scale. One firm, now engaged in building a crusher of 50 stamps, calculates on a handsome profit from quartz yielding as low as 4 to 5 dwts. to the ton. At Indian River a large amount of prospecting has been done, and considerable extent of ground applied for and under lease. Sherbrooke district has progressed during the last year in a remarkable degree. The increase in the number of men employed, the number of mines opened, and the building of five new crushers, mark a rate of development without parallel in the history of the Nova Scotian gold mines. Important discoveries have been made at Cochrane Hill and other outlying parts of the district, and a large number of areas have been leased. Tangier shows an increase of gold produced, but as yet the operations are only on a small scale. Some large and valuable properties are still lying idle, principally from want of capital to work them. The Strawberry Hill Mine is profitably worked, and preparations are being made for more extensive operations. Montague, also, shows an increase of gold produced, but the mining has not been of a more extended character than that of the previous year.

The Chief Commissioner has had a geological survey and plan made of the working part of the Waverley district, by Prof. HIND, M.A., F.R.G.S., which will be an efficient guide to the opening up of the mines, and also be the means of directing the attention of capitalists and miners to the real merits of a district second to none in the province. We have been favoured by Mr. HEATHERINGTON, of Halifax, with a copy of Prof. HIND'S report, which is certainly a most elaborate and valuable work. It comprises succinct accounts of the geographical and geological features, dislocations, disposition of outcrop of strata, and characteristic rocks of the district. In other chapters he refers to the probable identification of groups of leads in different districts, the general structure of leads, system of mining, age of the gold-bearing rocks of Nova Scotia, and furnishes some very useful general observations. There are two geological maps of the district on different scales, and numerous vertical, general, and cross sections, so that more complete information than that furnished by the report can scarcely be desired.

Operations are still carried on in the Oldham district in a small way, one mine only having been continuously worked for some time past. Renfrew continues to return a large quantity of gold, but has not reached that of last year; the Ophir and one or two others furnished the greater part of it. It was hoped from the splendid success of the Ophir Company that prospecting would have been carried on with energy; but little has been done outside of the old workings. There are two extensive mines in the locality of Lawrencetown, each with a crusher attached, both in operation. One of these mines has lately been sold, and the other is about changing hands. Both, it is said, will be actively worked in a short time. There is also a new mine, on which a considerable amount of labour has been expended, and which promises to be remunerative. Judging from the return from the two first opened mines, and the show of gold in the new one, these three mines will, no doubt, prove profitable; and, considering the success of prospectors outside of the above areas, the district will doubtless eventually be a large and profitable one. Uniacke district has steadily progressed, and the return of gold is larger than that of last year. The Ovens district has done little in the way of producing gold since the previous report. During the past year attention has been again turned to Wagamatcook, and prospectors have met with such success that a large crusher is in course of erection; a number of gold-bearing leads have been found one at least of large size; also some very fine worn specimens of gold in the alluvial deposits.

The past year has been unprecedented in the amount of prospecting done and the number of discoveries made, extending from Cape North to Cape Sable. At Cape North gold was found, and some prospecting licenses applied for, but the results have not been very satisfactory. A vein of copper ore was, however, discovered, and a number of licenses to search were issued. It appears that outside of proclaimed districts there have been during the year three crushers built, and five are in course of erection. It is now a well-established fact that the so-called veins are true beds, and extend over the whole country, but are only available where, by upheaval, they are brought to the surface. These beds are found not to be equally auriferous in all parts, but to hold the gold to a certain extent in bands running in a northerly and southerly direction, and with wonderful regularity; these bands vary in width as in richness, and the spaces between them vary also; and when a lead is found to be gold-bearing in any part, there is no part totally without it. As to whether these bands are continuous or not, there are not sufficient data to show; but from the distance that they have been worked (about 300 feet) there is reason to believe that they are so. It has also been found that when one lead in a group is auriferous the others are generally more or less so. Whether all the places in which gold is found in this province belong to the same band or not is at present unknown. Prof. HIND, in his surveys, has found some reason to believe that

Uniacke, Waverley, and Lawrencetown all belong to the same group. The mining hitherto has, to a great extent, been done on the supposition that the quartz was in veins, and not in beds; and when a rich spot is worked out, or the leads narrow down and disappear, it is supposed that the mine is exhausted. A number of well-paying mines have been abandoned at a depth when manual and horse labour could not perform the hoisting and pumping required, the profits having been divided as made, and no working capital set aside to meet emergencies and provide necessary machinery. Commencing mines on a small area of ground has also proved very detrimental to the gold mining interest, and sinking shafts seems to be a mania. An instance is given of 30 shafts sunk on one lead in a distance of 1800 ft., and 23 shafts in a distance of 1650 ft., on a lead not more than 50 ft. from the first named. There is also a great want of appliances and skill in saving the fine gold; it is computed, by good authority, that at least 30 per cent. of this gold is lost in the tailings. This loss has not been of so much importance under the system of mining hitherto followed; but if the poor ores are to be worked, a remedy must be provided.

The coal trade is still depressed, but considerable work has been done in extending old works, opening up new mines, and prospecting generally preparatory to an expected increase in the trade. In Cumberland county, at Spring Hill, a large seam has been opened (the seams heretofore worked were only small ones); it is only from 3 to 4 miles from the Intercolonial Railway, so that means of shipment are possessed which otherwise would have necessitated a large outlay. In Pictou county the opening of the Drummond Colliery, with its equipment of 7¼ miles of railway, and a splendid wharf on the Middle River, at which there are five loading places at present; the extensive enlargement of the Acadia Mine, with its railway connecting with the Nova Scotia Railway, and its extensive wharf at Fisher's grant; and the so-called New Mine, opened by the General Mining Association, put this county in a position to supply an almost unlimited demand at the shortest notice. In the county of Antigonish there have been some important discoveries. The works are as yet only of a preparatory character. In the island of Cape Breton coal mining continues in the same depressed state as last year. Some little progress has been made in the opening up of new mines, but nothing to compare with Pictou county. In the adjourned session of the Legislature last summer the plan of registration proposed in the report of last year was passed into law, which cannot but have an important effect in giving greater security to mining titles.

THE DURATION OF OUR COAL FIELDS.

In the House of Commons, on Tuesday, Mr. PEASE rose to call attention to the need of an early report from the Royal Commission appointed to enquire into the duration of our coal fields. The hon. gentleman commenced by remarking that his object in placing the notice on the paper was to elicit information rather than to impart it. At various times the question of the exhaustion of our coal fields had been brought prominently forward. Dr. Buckland was one of the first to take up the subject, and much more recently it was pointedly referred to by Sir William Armstrong, in the very able inaugural address which, as President of the British Association for the Advancement of Science, he delivered at Newcastle-on-Tyne. Sir William laid particular stress, not so much on the quantity of coals we had, as on the manner in which we were exhausting our coal fields, and as a matter of national economy recommended immediate attention to this great question. That address was followed by the publication of books on the subject by Mr. Hall and Prof. Jevons. The last-named gentleman, taking the quantity of coal at 100,000,000,000 of tons, computed that if the demand continued at the present rate it would become in about 100 years equal to the exhaustion of the whole of the present coal fields annually. Since the appointment of the Royal Commission, in 1867, the rate had continued very much the same as had been indicated by the right hon. gentleman the present Prime Minister some years ago. The quantity of coal wrought in this kingdom in 1854 was 64,000,000 tons, in 1861, 86,000,000 tons, and at the present time about 104,000,000 tons. The right hon. gentleman, in his Budget speech in 1866, laid very great stress on the value to the country of this enormous coal supply. The year before that speech was delivered the coal was valued at 16,000,000*l.* a year, and at the present time it was valued at no less than 24,000,000*l.* Well, in the June following that Budget speech his hon. friend the member for Glamorganshire brought this question before the House, the result being the appointment of a Royal Commission to investigate it. Among the members of that Commission were the hon. gentleman himself, the Duke of Argyll, Sir Roderick Murchison, Sir Wm. Armstrong, Mr. Dickinson, Mr. Elliot, M.P. for North Durham, Mr. Forster (mining engineer), and other gentlemen of eminence. It was of great importance that the result of their enquiry should be known, and he begged, therefore, to move a resolution to the effect that an humble address be presented to Her Majesty, praying her to take steps in order to procure a report from the Commission at an early date.

Mr. H. VIVIAN said that, as he had moved the appointment of the Commission, and had sat continuously upon it, he wished to say a few words on the present occasion. After due consideration, the Commission determined to apportion the various points into which the subject naturally divided itself to sub-committees especially acquainted with them. These points were the possible depths to which coal might be worked, the question as to whether waste occurred in the consumption of our coal, the question as to whether waste occurred in the working of our coal, the question as to the existence of coal fields under more recent strata, and the question as to the probable future consumption of coal. These committees had met frequently, and would soon end their labours; indeed, some had only to frame their report. Upon the subject of the future supply of coal, Sir R. Murchison had summed up the enquiries of the Committee by a memorandum, which stated that the result of the investigation, founded upon trustworthy geological data, would show that a very large amount of good fuel would be at our command after the exhaustion of the present known coal fields. That most difficult problem, the extent to which the consumption of coal may be expected to increase, had been undertaken by Mr. Robert Hunt, the head of the Mining Record Office and the Museum of Practical Geology, who had, besides making other enquiries, issued upwards of 12,000 circulars to colliery firms, steam-ship owners, manufacturers, and miners, and continued zealously prosecuting his labours. The duty of enquiring as to the extent of the coal existing in the fields at present in work had been intrusted to some of the most eminent coalowners. Various coal fields were allotted to various members of the Commission, and on Dec. 22 last they were requested to report to the Commission upon the progress of their respective enquiries. The only district completely finished was that which embraced the Bristol, Somersetshire, and Gloucestershire coal fields; of this only one seventy-ninth or one-fortieth, according to the depth taken, had been exhausted; and, supposing the national consumption to maintain an average of 100,000,000 tons a year, the supply from the district alone might be regarded as practically inexhaustible. He believed the reports upon the other coal fields would prove as satisfactory as this was, and it they did, there could be no reasonable doubt that we had coal enough for all time. This enquiry was a national stock-taking of that which nature had provided for many generations to come. The probable rate of consumption of coal in this country could be arrived at only by ascertaining the quantity of coal consumed in each special branch of our manufacture and for domestic purposes, and that could be ascertained only by consulting most difficult and complicated statistics. The necessity was strong that the Commission should report to the country at the earliest possible moment, but it was equally strong that the conclusions arrived at should be well founded. It was utterly impossible to exaggerate the enormous importance of this question. The greatness and prosperity of England reposed upon her manufactures, and her manufactures reposed upon her coal; therefore, he could quite understand the anxiety with which the report of the Commission was looked for by the country. He had been told that some persons doubted whether the investigation was worth its cost; but he believed 20,000*l.* would cover the whole, or, in other words, the expenses of the Commission would not exceed 1-600th part of the expenditure upon our army alone every year. From July, 1866, to March, 1867, it was found impossible to move in this great question from the uncertainty as to the amount which should be paid to those who assisted in the investigation. At last, after nine months' delay, it was determined that the mineral surveyors should be properly remunerated. He expected that by the end of the year the Commission would be in a position to report the result of their labours. He had not alluded to any of the conclusions to which they had come; but he might be allowed to say that the conclusions which he had the honour to express when he moved for the Commission remained entirely unshaken. (Hear, hear.) A bountiful Providence had laid up in this country a store of wealth which would contribute to her greatness for many generations to come. (Hear, hear.)

Mr. LIDDELL said he had seconded the motion of his hon. friend who had just sat down when he brought this question before the House, and he now congratulated both the House and the Government of the day on having selected so competent a person as a member of the Commission. (Hear, hear.) He agreed with his hon. friend that it would be extremely unwise to hasten the report of the Commission, because it should be remembered that it was not only information which the Commissioners had been able to obtain, but also the conclusions which the most able scientific men in the country would deduce from that information. (Hear, hear.) If the inferences were hastily drawn, they might lead the country into a panic, which it had been the object of his hon. friend's motion to remove.

Mr. GEORGE ELLIOT expressed his concurrence in the view that our supply of coal was practically inexhaustible. His strong conviction was, and it was supported by conclusive evidence, that there was greater waste in the production of coal than in anything else. The system of working coal had been very much improved of late years. The great question was how mechanical ventilation could be best introduced, and within the last three years there had been, as he had expected, a great development and much additional security arising from the adoption of the new system of ventilation which he had mentioned at the first meeting of the Royal Commissioners. The question of the exhaustibility of our coal mines depended upon the question at what depth the coal could be worked, and this, in turn, was measured by the heat at which human labour could be exerted. (Cheers.)

Mr. BRUCE said he had listened with great interest to the discussion, in which his hon. friend the member for Glamorgan had justified the delay in issuing the report of the Commissioners, and in which hon. members had urged, on the other hand, the importance of the publication of their report at the earliest possible period. When they considered the immense variety and extent of the interests involved—the importance of preventing any waste of our coal fields, and the geological enquiries which, as his hon. friend believed, would show the existence of vast undiscovered fields of coal—the country would, he thought, be of opinion that the Commissioners had exercised a wise discretion in patiently and laboriously collecting the fullest materials for the valuable and interesting report which he had no doubt they would give to the world. He agreed with his hon. friend the member for Glamorgan that the supply of coal in this country was almost indefinitely great. It was, however, desirable that we should be informed as to the best means of preventing its waste, and how it could be worked and obtained in the cheapest manner, so that our coal proprietors might economise the stores that were nearest at hand. After what had been said that night the House would anticipate from the report of the Royal Commissioners a rich store of the most useful information, and under these circumstances he trusted that he need not urge his hon. friend not to press his resolution.—The motion was then withdrawn.

GEOLOGICAL SOCIETY OF LONDON.

June 9.—Sir R. I. MURCHISON, Bart., F.R.S., V.P.G.S., in the chair.

William Shelford, Memb. Inst. C.E., Westminster Chambers, Victoria-street, S.W.; E. Teschemacher, Highbury Park, N.; George Ludovic Houston, Johnstone Castle, Renfrewshire; and T. Barkas, Newcastle-upon-Tyne, were elected Fellows of the Society.

1.—"Notes on the Sutherland Gold Fields," by the Rev. J. M. Joass: with an Introduction by Sir R. I. Murchison.

Sir R. I. MURCHISON, in introducing the Rev. J. M. Joass to the meeting, called attention to the general geological structure of the counties of Sutherland and Ross, and especially to the circumstance that the summits of the mountains of that region are situated within a few miles of the western shore, forming a steep escarpment to the west, and a long slope to the east, across which the disintegrated materials of the great mass of these mountains must have been conveyed (probably by floods carrying masses of ice), and deposited in the hollows of Eastern Sutherland. Of the rocks composing the mountains, Sir R. Murchison was inclined to regard the micaceous flags and schists overlying the lowest Silurian quartzites as the probable source of the gold found in Sutherland, and he expressed an opinion that no considerable body of rock charged with rich auriferous bands would be discovered in the North Highlands.

The Rev. J. M. JOASS said that the extent of country over which gold has been ascertained to occur in the south-east of Sutherland and contiguous portion of Caithness may be stated as measuring 20 miles from north to south, and about 30 miles from east to west. The prevailing rocks of the district, which are flaggy quartzites and micaceous beds dipping S.E., are now ascertained to belong to the Lower Silurian system. The associated rocks on the S. and S.E. are—(1). Old Red Sandstone, occurring as conglomerate cliffs at Cambusmore, &c., overlain by the argillaceous shales of Sydera with fucoid plants, and the thick-bedded light-coloured Sandstones of Dornoch with *Holoptychius:* isolated mountain masses of conglomerate occur throughout the district.—(2). Along the coast from Dunrobin to the Ord of Caithness, rocks of Liassic and Oolitic age occur.—(3.) The igneous rocks associated with these are porphyritic granite (*a*) of the Ord, between the Lower Silurian and Devonian rocks, and found to contain purple fluor-spar; a fine-grained red granite (*b*), abundant throughout the auriferous district, conforming in its courses to the strike of the flaggy gneissose strata; and a friable granitiform rock (*c*), mostly felspathetic, generally associated with the richest auriferous drifts. In the Ulsge-dubh and Allt-Smeorail, Strath Brora, gneissose and quartzose beds occur, dipping S. and S.E., associated with conformable courses of granite (*b*) and small quartz veins. The overlying drift is at bottom argillaceous, with boulders of neighbouring rocks passing upward into gravel and sand, apparently arranged by running water. On the River Helmsdale, above the junction of the Crask and Cill-Donnan roads, micaceous rocks, dipping north-east, are traversed along the strike by granite (*b*) which sometimes sends out short dykes across the beds, as if into transverse fissures, from which small veins strike off between the strata or lines of least resistance. Here a small trap dyke crosses both igneous and stratified rocks. Two miles to the north of this point, at the head of Suisgill Burn, a favourite resort of the diggers, the white granitiform rock (*c*) appears to cross at right angles highly inclined beds of friable gneissose rock. The detritus of (*c*) occurs in patches of felspathic clay throughout the drift, and is generally associated with the richest auriferous deposits. The best washes have been found in a similar connection in Cill-Donnan Burn, three miles to the S.E., and also near small quartz-veins, thinly encased in chloritic clay and traversing gneissose beds. In the two streams last mentioned, and in all the other tributaries of the River Ullie from the north, the dip of the flaggy quartzose and gneissose rocks through which they run is easterly, with a few local rolls; till at Cill-Pheader Burn, 3½ miles from Helmsdale, the porphyritic rock of the Ord is reached, and continues to the coast, and the drift is no longer worth washing. Within the neighbouring district of Caithness the metamorphosed Lower Silurian rocks appear as quartzite mountains, some of which are capped unconformably by Old Red Sandstone. Where flaggy gneissose beds occur, as at Allt-an-lic, the easterly dip is distinct, and persists up to the junction with the Devonian Sandstones on the S.E. These latter, at Berriedale, on the coast, dip E. and N.E., passing under the bituminous flags, which principally represent this system in Caithness. If the gold of Sutherland be derived from the binary compound of felspar and quartz (*c*), so abundant in Suisgill and Cill-Donnan, the Caithness district does not promise to be richly auriferous; as this rock is, so far as could be seen, by no means plentiful there. Judging from the frequency with which this quartzo-felspathic rock is associated with the richest washings, and from the fact that gold has been found in small rolled specimens of stone which seem to have been derived from this rock, it is possible that it may yet be discovered to be the matrix of the gold. Hitherto, however, none has been found in rock *in situ*. It is believed that the extent of the gold fields will be determined by the range of the metamorphosed Lower Silurian rocks, and that its richness may, therefore, be in proportion to the degree in which it is associated with such rocks as are either eruptive or highly metamorphosed. The connection of the Pictish Towers with this subject is worthy of notice. Of 60 of these forts in the county of Sutherland, 33 occur within the Cill-Donnan district. They seem to have been erected against maritime invaders, who were probably attracted by the known existence of native gold. The very numerous sepulchral tumuli of the auriferous district imply a large Archaic population.

Prof. RAMSAY regarded it as certain that no quantity of gold would ever be found in purely glacial deposits, as in such detritus specific gravity went for nothing, but when those deposits came to be sorted by water the gold became apparent, as in this case. He agreed with the author in regarding the granites in Kildonan Burn as metamorphic rather than intrusive, and had long held this opinion. The felspathic dykes were probably due to other causes.—Mr. D. FORBES, on the contrary regarded the granite as eruptive, and accounted for the granitic veins following the lines of stratification, inasmuch as those were the lines of least resistance. The smaller interstices caused by the intrusion of the granite would be filled with quartz veins derived from the granite, both probably containing gold. He considered that the gold had not been derived from Silurian rocks, but from the intruded granite, or from the quartz veins.—The AUTHOR was inclined to regard the granite in some instances as intrusive, and in others as metamorphic.

2. "Observations on the 'Nuggetty Reef,' Mount Tarrangower Gold Field," by Dr. G. H. F. Ulrich, F.G.S.

The author commenced by indicating the position and characters of the so-called "Nuggetty Reef," which is situated about 2½ miles N.N.W. of the little town of Maldon, about 87 miles N.W. of Melbourne, and consists of two strong quartz veins, separated by a mass of bluish-grey metamorphic sandstone. In certain places the "reef" is cut transversely or obliquely by granite bars or veins, of which the author described four, and stated that although some of them are, and all probably have been, connected with the main mass of granite, they present rather the appearance of zones of impregnation than of instrusive dykes, there being no line of separation between the quartz rock and the granite; but felspar and black mica make their appearance in the quartz, and gradually increase in quantity until the granite band is formed. The author noticed the following minerals as associated with the gold in the "Nuggetty Reef:"—Iron pyrites, arsenical pyrites, magnetic pyrites, copper pyrites, galena, zinc-blende, and a compound of gold and bismuth, to which he gave the name of *Maldonite*.

3. "On the Caratal Gold Field," by Dr. C. Le Neve Foster, F.G.S.

The author stated that the Caratal Gold Field is situated about 100 miles south of the Orinoco, at a point about 75 miles above its principal mouth. The rock of the district is chiefly gneiss, with some mica schist, hornblende schist, and granite. The gold occurs in four ways:—1, in lodes, veins, &c.; 2, in alluvial or "placer" diggings; 3, in red earth or "Tierra de flor;" and 4, in gravel and sand of river beds. The mode of occurrence of the gold in these different places, and the various processes employed in collecting it, were described by the author, who estimates the quantities of the precious metal obtained in the Caratal district as follows:—In 1866, 15,587 ozs.; in 1867, 30,142 ozs.; in 1868 (9 months), 22,481 ozs. The greater part is obtained from the lodes.

4. "On the Geology of Guyana in Venezuela," by Ralph Tate, Assoc. Linn. Soc., F.G.S.

5.—"On the Nature and Cause of the Glacial Climate," by Mr. Jos. John Murphy, F.G.S.

On Wednesday the following communications will be read:—1. "On two new species of *gyrodus*," by Sir Philip de Malpas Grey Egerton, F.R.S.—2. "On a large Saurian Humerus from the Kimmeridge Clay," by J. W. Hulke, F.R.S.—3. "On a Gavial-like Saurian (*Dakosaurus*) from Kimmeridge Bay," by J. W. Hulke, F.R.S.—4. "On Australian Mesozoic Geology and Palæontology," by Mr. Charles Moore.—5. "On Plant and Insect Beds in New South Wales," by Mr. Charles Moore.—6. "On the Correlation, Nature, and Origin of the Drifts of North-west Lancashire," by D. Mackintosh, F.G.S.—7. "On the Connection of the Geological Structure and Physical Features of the South-East of England, with the Consumption Death-rate," by Wm. Whitaker.—8. "On the Volcanic Phenomena of Hawaii," by the Rev. C. G. Williamson: communicated by Sir R. I. Murchison.—9. "On the Intrusive Igneous Rocks of the Lake District," by Dr. H. A. Nicholson.—10. "On the Graphite of the Laurentian of Canada," by Prof. J. W. Dawson.—11. "On the Fossil Myriopods of the Coal Formation of Nova Scotia and England," by Samuel H. Scudder: communicated by Sir Charles Lyell.—12. "On the Geology of the Country surrounding the Gulf of Cambay," by A. Rogers.—13. "On the Geology of a portion of Abyssinia," by W. T. Blanford.—13. "On a New Acrodont Saurian from the Lower Chalk," by J. Wood Mason.—15. "On the Rodentia of the Somerset Caves," by W. A. Sanford, Esq., F.G.S.

COATING OF SHIPS' BOTTOMS.—At the Royal National Life-Boat Association meeting, held a few days since, numerous awards were made for services rendered by crews of life-boats in saving life; and it was announced that Mr. and Mrs. Richard Thornton West had presented 700*l.* to the institution to defray the entire cost of the life-boat establishment to be formed on Port Isaac, on the Cornish coast, and the first year's expenditure of the station. The Ancient Order of Foresters had also given the society 650*l.* for the Foresters' No. 2 life-boat establishment. Legacies to the amount of 500*l.*, 300*l.*, and 100 respectively had been bequeathed to the society by the late Mr. John James Sturm, of High Holborn; the late Mr. John Bewley, of Kingsland; and the late Miss Lucretia Tuckett, of Osnaburgh-street. A friend to the Nottingham branch of the institution had given it 100*l.* Various estimates to the amount of 468*l.* for constructing life-boat houses, and for other works at different life-boat stations, were accepted. The whole fleet of life-boats of the institution, now numbering upwards of 200 boats, was ordered to be painted, as usual, with the composition paint of Messrs. Peacock and Buchan, of Southampton. Payments amounting to 1332*l.* were made on various life-boat establishments. A report was read from Captain D. Robertson, R.N., the assistant-inspector of life-boats, on his recent visits to life-boat stations on the Irish coast. Captain Robertson stated that he had everywhere found the boats in admirable order. Sir William Hall drew attention to the lamentable loss of life on recent occasions from some fishing-boats off the coast of Scotland, which excited greatly the commiseration of the meeting. The institution had built several safety fishing-boats in Scotland, and some boats there on that model had been built.

OUR TRADE AND COMMERCE.

To state that a new and revised edition of M'CULLOCH's Dictionary of Commerce has been issued would probably be as much information as most men moving in commercial circles would require to induce them to replace their old edition by the new one, more especially when they learn that the revision and correction of the volume* has been conducted under the supervision of one who for many years was secretary to the original author of the work, and must, therefore, have become so intimately acquainted with his style of writing and sources of information as to prevent any want of continuity or uniformity in the record of facts given; yet upon casually glancing through the book—to carefully read and analyse a volume of 1358 pages, closely printed in small type, is, of course, out of the question—so much is met with that is interesting that a reference to some few of the opinions expressed may not be out of place. Whether we turn to the articles upon commercial subjects proper, or upon subjects indirectly bearing upon commerce, the views expressed appear to have been equally well considered; the references to copyright, patents, railways, mining and other companies, metals, &c., each displaying an intimate acquaintance with the matter discussed.

Alluding to "Newspapers," it is observed that the great difficulty under which the leading journals are at present placed is the want of any available copyright in the news or in the articles which they supply. The important information collected by the agents for the Times in all parts of the world, and the able disquisitions in that and other journals, may be (and, no doubt, will be) published in an hour or two after their first edition in London in low priced journals in Manchester, Liverpool, Glasgow, and so forth. This is a gross abuse: and though it be difficult to deal with, it seems pretty evident that if it be not put down it can hardly fail, by robbing the metropolitan journals of great part of the advantages derived from their extensive connections and vast expenditure, to make them less anxious to cater for their readers, and so to degrade the quality as well as the character of the press.

Upon another subject in which the public are equally interested—Railways—the remarks in the Dictionary are equally valuable, more especially so at a time like the present, when we are on the eve of the introduction of a new system closely allied to that of railways—we allude, of course, to the system of street tramways. It is contended, and, no doubt, with justice, that no Act authorising a private association to construct a railway or canal, to lay down gas pipes, to convey water into a town, or for any such purpose, should ever be passed without reserving to Parliament power periodically to revise the tolls granted under it. Such revisions would secure to the public a participation in future improvements not in the contemplation of parties when the project was entered upon; and it would do this without in any degree clogging the spirit of enterprise. It has been objected that the reserving to the public of power to revise the charges on railways and other public works would be of no use, inasmuch as the parties would contrive so to swell their charges as to make their revenue appear not more than a fair return on their outlay. But if charges are to be revised, Government must be authorised to appoint parties to enquire carefully into the management of all concerns with which it is proposed to interfere; and it would be the duty of such parties to proscribe every useless expense, and to ascertain how the railway would be carried on supposing it were wrought under a system of open competition, and at the least expense, and to frame their report accordingly.

The law with respect to Patents is, in Mr. M'Culloch's opinion, unavoidably encumbered with several difficulties. The expediency of granting patents has been disputed, though, as it would seem, without sufficient reason. Were they refused, the inducement to make discoveries would, in many cases, be very much weakened, at the same time that it would plainly be to the interest of everyone who made a discovery to endeavour if possible to conceal it. And notwithstanding the difficulties in the way of concealment, they are not insuperable; and it is believed that several important inventions have been lost from the secrets dying with their authors. On the other hand, it is not easy to decide as to the term for which the patent, or the exclusive privilege, should be granted. Some have proposed that it should be made perpetual, but this would be a great obstacle to the progress of improvement, and would lead to the most pernicious results. Perhaps the term of fourteen years, to which the duration of a patent is limited in England, is as proper a one as could be suggested. It may be too short for some inventions and too long for others, but, on the whole, it seems a pretty fair average.

Under the head of Mining Companies a mass of information is given, which might be read with advantage by those who have the disposition to embark in South American mining in preference to home mining at the present day. There is an account of the mania which prevailed in London for Mexican mines in 1824 and 1825, when the working of the Real del Monte Mines, the Anglo-Mexican Company's mines at Guanaxuato, and the mines of the United Mexican Company was commenced. It is mentioned that in embarking in the mines the fact that an enormous expenditure was necessary to bring them into working order was not taken into consideration, even when it could be ascertained, the statement that the working of mines in Mexico had enriched many families sufficing to induce investment. Indeed, foreign mining enterprise seems to have been embarked in then as it too frequently is at present—not from any thought that the mines will return profits, but that the opportunity will arise for selling the shares at a premium. Mr. M'Culloch remarks—"and yet lawyers, clergymen, and even the nobles of the land, were candidates for shares in these miserable bubbles, in the hope of finding (in which, luckily, most of them were disappointed) some dupe to buy their shares at a premium. Those who may be desirous of seeing the extent which the public credulity was practised upon in 1824 and 1825 may consult a pamphlet published by Mr. H. English, broker, in 1827, which contains an account of all the joint-stock companies formed and projected in these memorable years. It presents the most extraordinary picture. There were in all 74 mining companies formed and projected. The number and quality of the other schemes were similar. It is due to Mr. Baring (the late Lord Ashburton) to say that he denounced the evil when in progress, and warned the unthinking multitude of the ruin they were bringing on themselves; but to no purpose."

Extracts might be multiplied to almost any extent, but the above will suffice to show the nature of the information given. It matters little upon what subject, coming within the scope of the book, knowledge is sought, a reference to the Dictionary will invariably supply it, and that, too, in a concise and comprehensive form, which could not be hoped for in any other single volume. The Dictionary is really invaluable.

* "A Dictionary, Practical, Theoretical, and Historical, of Commerce and Commercial Navigation." By the late J. R. M'CULLOCH. New edition, revised and corrected throughout. Edited by HUGH G. REID, secretary to Mr. M'Culloch for many years. London: Longmans, Green, and Co., Paternoster-row.

PRODUCTION OF IRON AND STEEL.—The invention of Mr. JOHN HEATON, of Langley Mills, Derby, just specified, relates to improvements in the manufacture and production of iron and steel, and consists in the employment of the cinder or slag resulting from the balling of steel or of steely iron which has been obtained by the action of nitrate of soda or of nitrate of potash upon cast-iron, either in a converting vessel or apparatus such as is described in the specifications of Letters Patent granted to him (Nos. 798 and 1295), or in any other suitable furnace or apparatus. This cinder or slag he employs either in what is known as the puddling process for the production of malleable iron, or of steel from cast-iron, or in the blast-furnace, for the purpose of improving the quality of cast or pig iron to be produced. In the employment of the product obtained by heating together oxide of iron and carbonate of soda, or caustic soda, or mixtures of the same for the production of malleable iron or steel from cast-iron, in what is known as the puddling process, and also its employment in the blast-furnace, for the purpose of improving the quality of cast or pig-iron to be produced.

ATMOSPHERIC WATER-ELEVATING ENGINES.—Messrs. Andrew J. REYNOLDS, of Chicago, and J. J. NEWELL, of Adrian, U.S., have patented an invention, the object of which is the elevation of water by atmospheric pressure, through the agency of a vacuum, superinduced in part by the action of the discharging column, and in part by the condensation of steam after it has exerted its pressure on a float or piston to aid in expelling the water. The invention consists, firstly, in constructing such engine with a double—that is to say, with an upper and a lower cylinder, the latter of which is, properly speaking, the condensing cylinder. The invention also includes certain devices for condensing the steam (which is let into the upper cylinder to destroy the vacuum, and allow the water to fall to the level of the discharge valve), by the momentum of the falling water, which enables it to pass through a floating piston of the upper cylinder into the water in the condensing cylinder. Likewise the invention consists in the means for discharging the surplus steam, air, or gases through a valve in the head of the upper cylinder, by means of the momentum or concussion of the water forced up by atmospheric pressure and exerted on the piston, the upper cylinder being several feet less in height than the atmosphere would raise the water. Furthermore, the invention consists in an arrangement of three valves on a main operating rod within the cylinder, by means of which the effects hereinbefore stated are produced. Also, the invention includes a duplicate arrangement of upper and lower cylinders, with floats or pistons to the upper cylinders, geared to work in unison, and in reverse directions, for the purpose of keeping up a continuous discharge, the main or general principle of action being the same as in the single engine herein before referred to, but the main operating rods which pass through the upper cylinders being made to have a continuous motion with the pistons which are attached to them, instead of having a limited and intermittent motion at the opposite ends of the stroke, as in the single engine arrangement. The upper and lower cylinders are connected together by bolts passing through their flanges, a ring composed of some bad conductor of heat being interposed between them. The bottom of the lower cylinder is connected with a water supply pipe, the openings to which are closed by valves fitted to the cylinder and opening inwards, and leading from the side of the cylinder in the discharge pipe, the end of which is turned upwards and fitted with a valve that is capable of closing it. The floating piston is fitted to the upper cylinder, and it is pierced with openings forming passages of communication between the upper and lower cylinders. This piston slides freely on a central rod, which carries below the piston a floating valve, designed to close at proper times the openings in the piston. To ensure this valve following the piston it is contained in a cage attached to the floating piston, and below the cage the rod carries a stop, through which the rod receives the downward thrust of the piston. Above the piston is a second valve, which is free to slide on the central rod, upon which a shoulder is made to receive it; this valve is also intended to close the open-

ings in the piston at certain periods of its action. The upper end of the rod projects upwards through the closed cover of the top cylinder, and to it a rock lever is connected, which is weighted to balance the weight of the rod; affixed to this rod within the cylinder is a valve for closing and opening, made in the cover of the cylinder, and thereby stopping the action of an escape valve with which this opening is fitted. The top cylinder is provided with a steam pipe leading from a boiler, and a slide valve worked by the weighted rock lever is used to open and cut off the supply. To set this engine in action the valve of the discharge valve is first screwed down, and the engine is then filled with water; the central rod is then lifted by hand, and steam is admitted to the upper cylinder, and the valve of the discharge valve is then released. The water being now free to escape, the operations above detailed will then take place in their proper order, and a large discharge will be rapidly and economically effected. With a double-action engine, constructed according to this invention, a continuous discharge will be obtained, the pistons of the duplicate cylinders acting alternately to effect the discharge, slight modifications from the arrangement just described will in this case be required. Thus, for example, the valves provided in the top of the cylinders for allowing of the escape of superfluous steam and of air will be weighted to prevent the escape past them of the incoming steam supplied to the cylinders, the valve carried by the central rod in the single arrangement for performing this duty being dispensed with.

FOREIGN MINING AND METALLURGY.

The results obtained by the Grand' Combe Mines Company in 1868 were more profitable and advantageous than those of 1867. The production amounted in 1868, in round figures, to 460,000 tons, showing an increase of 12,500 tons as compared with 1867. This increase was, however, far from compensating for the successive reductions of the two previous years, which were 16,700 tons and 48,300 tons, making a total of 65,000 tons. As regards the consumption, the sales in the interior of France last year showed an increase of 32,000 tons, as compared with 1867, while the sales beyond France declined 16,000 tons, leaving the final augmentation of the year at 16,000 tons. The company manufactured last year 170,120 tons of agglomerates, or 2670 tons less than in 1867. On the other hand, the production of coke in 1868 amounted to 17,000 tons, showing an increase of upwards of 12,000 tons, and corresponding to the employment of about 20,000 tons of coal. The total rough profits realised by the company last year amounted to 76,801*l.*, showing an increase of 4937*l.* as compared with 1867. The profit has grown more rapidly than the production—in other words, the profit per ton has slightly increased. This arises not from an improvement in the sale prices, which, on the contrary, have rather continued to give way, but from a reduction in the cost price of the extraction, properly so called. After increasing the statutory reserve, and providing for the loan charges of the year, the balance of net profit for 1868 was 61,005*l.*, or 4413*l.* more than in the previous year. The council proposed to distribute 2*l.* 8*s.* per share (instead of 2*l.* 4*s.* per share distributed for 1867), representing a sum of 57,600*l.*, and leaving a balance of 3405*l.* to be carried forward.

A good flow of orders for iron is still remarked on the St. Dizier market; pig is, however, an exception to this remark. Machine iron forms the subject of serious orders; this is a somewhat remarkable fact, considering the period of the year at which we have now arrived, as generally the sale is quiet at the present season. Rolled iron, from coke-made pig, is maintained firmly at 8*l.* 4*s.* to 8*l.* 8*s.*; ditto, from charcoal-made pig, 9*l.* to 9*l.* 8*s.* per ton. Machine iron, No. 20, coke-made, 8*l.* 4*s.* to 8*l.* 12*s.*; mixed ditto, 9*l.* to 9*l.* 4*s.*; charcoal-made ditto, 9*l.* 16*s.* to 10*l.* per ton. Considerable activity prevails among the foundries in the St. Dizier district; orders for pipes are abundant, and an improvement of 4*s.* per ton has taken place in prices. The other French metallurgical groups present little change. An adjudication recently took place for 660 tons of iron wire, to be supplied to the administration of telegraphic lines. MM. Camplonet and Guengnron obtained the contract for one lot at 20*l.* 6*s.* per ton, and for another lot at 19*l.* 18*s.* per ton. The tenders for the remaining lots exceeded the maximum price fixed by the administration, and no contract was consequently let. The accounts presented to the shareholders of the Marseilles Blast-furnaces, &c., Company (which also owns the Portes and Senechas Mines) show a net profit for 1868 of 42,616*l.* After making various reserves and redemptions, the directors recommended and carried a dividend of 1*l.* 0*s.* 10*d.* per share, absorbing 37,440*l.*, and leaving 48*l.* to be carried forward to the credit of 1869. Of the dividend of 1*l.* 0*s.* 10*d.* per share, 9*s.* 5*d.* per share was paid in April, 1869, and the balance of 11*s.* 5*d.* per share will be paid in October.

A report of the Charleroi Chamber of Commerce attributes the revival of the iron trade in that district in 1868 to the prosecution of great railway works in Austria, Hungary, and Russia. There is nothing very novel in this conclusion, but the Chamber gives an official stamp and record to the fact. The report makes the following observations with reference to supplies of minerals:—"Our blast-furnaces supply now a part of their wants with the minettes and other minerals of the Moselle and the Luxembourg. In consequence of the successive exhaustion of our mineral bearings, and the great requirements of consumption, these products have now become indispensable to our industry. The importation of Moselle and Luxembourg minerals in 1868 was 390,000 tons, representing nearly one fourth of the consumption; they cost, however, considerably more for railway transport to the Charleroi district than to the blast-furnaces of the North of France; and it may, then, be affirmed that the conditions attending the production of pig are more favourable in the Luxembourg and in certain cantons of France than in the Charleroi basin. The minerals of the Luxembourg and the Moselle being indispensable to the regular supply of our works, the rate of transport is now too high as compared with that applied to transports to France; it is important, then, that the charge made should be reduced in the interest of our blast-furnaces, in order to maintain them in a condition in which they can support the competition of the owners of French furnaces." The good tone which has distinguished the Belgian metallurgical market of late is maintained, and a slight advance has even appeared in the three groups of Liége, Charleroi, and the Centre. The rate for No. 1 iron has been carried to 6*l.* 12*s.* per ton.

The Charleroi Chamber of Commerce, referring to the coal trade of the basin, says—"Although the working of coal exceeded in 1868 the total production of 1867, the condition of the local coal trade was far from satisfactory in the season which has just closed. Stimulated by the high prices which coal had attained in 1866 and 1867, the production of 1868 exceeded the requirements of consumption, which were probably restricted under the influence of high rates. However this may be, that happened for coal, which always occurs under such circumstances. The requirements of the trade and of industrial consumption being less than the production, the price of coal successively diminished, stocks formed, and the disposal of supplies became more difficult in proportion as the offers made were more pressing. This state of affairs prevailed all through 1868, and the reduction which the price of coal experienced during the 12 months cannot be estimated at less than 20 per cent. This proportion would be still more considerable if the comparison applied only to those descriptions of coal which more particularly experienced the influence of the fall. The cost price of extraction diminished last year, but to a less extent than the selling price. The reduction in the price of labour may be estimated at nearly 6 per cent.; this reduction was, perhaps, however, more apparent than real, as will be seen from the following explanation:—In 1866 and 1867 there was a scarcity of labourers of certain classes, such as loaders, fillers, &c., and their places were supplied by miners, whose wages were nearly double. A high average rate of wages consequently prevailed in 1866 and 1867, while there was some reduction in the average wages paid for 1868, when this anomaly no longer existed. The reduction obtained in the average cost of labour last year was, then, rather the result of a better employment of labour than of any diminution in the wages of the workpeople in their respective categories. However this may be, we may estimate the reduction in the price of coal at at least 15 per cent., the whole at the charge of the coal worker. To this loss which producers experienced in consequence of the reduction in prices, we may add the losses occasioned by the disorders of which the Charleroi basin was unfortunately the theatre in 1868. The strikes which occurred among the workpeople not only checked the progress of the workings, and occasioned considerable material losses, but they also disorganised labour and interrupted working operations at several points during a rather lengthened period; and it will be readily understood that these circumstances have weighed in an extremely unfavourable manner on the results of the past year. Since these painful events our colliery workmen have generally appeared more tranquil, notwithstanding excitements of every kind, of which they have not ceased to be the objects; and in this regard we are happy to note that the propagators of subversive doctrines seem to be sensibly losing ground. The number of workmen employed by the coal trade of our basin was, in 1868, 35,089, while in 1867 it was 35,210. There were, then, rather fewer workmen employed last year than in 1867; but, notwithstanding this reduction, and the loss of time occasioned by strikes, the extraction of coal in 1868 was sensibly heavier than in 1867, the increase being 50,000 tons. The exports of coal from the basin last year were 194,334 tons more than in 1867, but 213,110 tons less than in 1866. The exports of coke last year were 539,666 tons, against 516,898 tons in 1867, but they presented a decline as compared with 1866, when they amounted to 547,504 tons."

The French copper markets have been quiet; the German markets have also remained without material variation. Tin has only undergone some insignificant variations at Havre; at the same time, the tendency appears to have been rather towards improvement. At Amsterdam the tin market has been very quiet, and there is no change to note in prices. Advices from Batavia report a public sale of 5000 piculs at an average of 95 fl. There is not much change to note in lead upon the French markets, but the German markets seem to have been rather firmer. There has been rather more firmness in zinc, especially upon the German markets.

VISIT OF THE PRESIDENT OF NICARAGUA TO THE CHONTALES MINES.—**In the course of an official tour through the State, His Excellency, Don Fernando Guzman, accompanied by ministers and suite, visited the mines of the Chontales Company on April 27. This was** the first occurrence of such an event, inasmuch as during the term of office of the late President the Chontales district was inhabited only by a few Indians, but since then the establishment of the European mining companies has converted it into one of the most important parts of the State, while the example of energy and industry thus shown to the inhabitants cannot fail to produce a most beneficial effect upon the development of the resources of the country. The President spent the previous day at the Javali Mine, and on the morning of his visit to Chontales was accompanied by Dr. B. Seemann, the managing director of the Javali Company, as far as the boundary between the two properties, where His Excellency was received by Mr. Belt, the chief commissioner of Chontales, and some of his staff. Passing beneath several arches of everygreens, with suitable inscriptions, he arrived at the entrance to the commissioner's house, when a salute was fired from a neighbouring rock, and a hearty cheer rose from the miners and others employed by the company. His Excellency afterwards examined the machinery for extracting the gold, the different stages of the process being explained to him. His Excellency then visited some of the mines, where he saw the ore taken from the stopes, sent down by a flying-machine, and trammed to stamps. Bowers of evergreens, with refresments, were formed at the entrance of the mines, and the tramways ornamented with flags, banners, and triumphal arches. At a banquet in the evening the usual toasts were drunk; the festivities lasted to a late hour, concluding with a display of fireworks, and the illumination by bonfires of the surrounding hills. The President expressed himself much pleased with the great progress that had been made in the district, and expressed the intention of his Government to encourage in every way the immigration of foreigners; and in addition to the beneficial alterations recently made in the mining laws, to further legislate on the basis of the suggestions that had been made by the representatives of the company, so as to remove all those obstructions that have hitherto acted as checks to mining enterprise.

FOREIGN MINES.

CHONTALES.—W. Evans, April: San Antonio: No. 5 level, west of shaft, has been timbered and well secured 10 varas; also No. 5 level, east of shaft, has been secured 8 varas. No. 1 stope, in the back of No. 5 level, has been stoped 9 varas; lode at present 3½ ft. wide, yielding 7 dwts. of gold per ton. No. 2 stope has been stoped 8 varas; lode at present 3 ft. wide, yielding 7 dwts. of gold per ton. No. 1 stope, east of shaft, has been stoped 6 varas; lode 2½ ft. wide, worth 5 dwts. of gold per ton. The deep adit level, west of shaft, has been driven 14 varas; lode 3½ ft. wide, yielding 3 dwts. of gold per ton. The lode at this point appears to be improving, and I have no doubt but the ground between this level and the bottom of the old mine will prove a valuable piece of ground, as the lode has the same appearance as in the old mine.—Santo Domingo: We are engaged at present taking out the pillars east and west of the old shaft; the lode at present is 6 ft. wide, yielding 9 dwts. of gold per ton. This part of the mine we intend pushing on with all speed, as it will not be so easily got at during the wet season.—Trinidad: The deep adit level has been driven 6 varas; lode 4 ft. wide, yielding 3 dwts. of gold per ton. No. 2 stope has been stoped 13 varas, yielding 4 dwts. of gold per ton. No. 3 stope has been stoped 13 varas; lode 3½ ft. wide, worth 5 dwts. of gold per ton. No. 4 stope has been stoped 13 varas; lode 4 ft. wide, worth 6 dwts. of gold per ton. No. 5 stope has been stoped 24 varas, yielding 6 dwts. of gold per ton. No. 6 stope has been stoped 15 varas; lode 4 ft. wide, yielding 6 dwts. of gold per ton. No. 7 stope has been stoped 11¼ varas; lode 4 ft. wide, yielding 7 dwts. of gold per ton. This mine is now in a very good working condition, with tramways and shoots complete, so as to enable us to break and tram to mill a good supply of quartz, at the small cost of $1·10 per ton, including all expenses. The quartz sent to mill during the month is as follows:—131 tons from Santo Domingo, which I estimate at 7 dwts.; 121 tons from San Antonio, at 8 dwts.; and 473 tons from Trinidad at 6 dwts. In all, I estimate it to be 235 ozs. of melted gold.

Consuelo and Estrella.—J. Tonkin, April: No. 1 stope, in the back of No. 2 level, east of No. 2 shaft, has been stoped 27 varas; lode 4 ft. wide, worth 9 dwts. of gold per ton. No. 2 stope, in back of same level, east of No. 2 shaft, has been stoped 40 varas; lode 4 ft. wide, worth ½ oz. of gold per ton. No. 3 stope, in back of the same level, east of No. 2 shaft, has been stoped 19 varas; lode 3½ ft. wide, worth 12 dwts. of gold per ton. No. 4 stope, in back of No. 3 level, east of No. 2 shaft, has been stoped 11 varas; lode 3 ft. wide, worth 7 dwts. of gold per ton. Our produce of gold has fallen off this month, in consequence of a horse forming in the lode about 1 ft. wide, and passing through all the stopes above mentioned, but from the appearance of the horse at present I think it will disappear very soon, and when the lode gets to its regular course I am of opinion that we shall get in our run of orey ground, as the lode lasted good home close to the point of the junction with the horse. Our No. 4 deep adit level has been driven this month 7 varas; lode small and poor in this point, and much harder than last reported. Several points of our mine have not turned out as we expected, therefore our quantity of orey ground has been limited, still I am of opinion if we push on we shall soon get through this poor ground, and get to some as good as we had before. We sent to mill this month from the mines 612 tons, at an average of ¼ oz. of gold per ton, in which quartz I estimate to be 306 ozs. of melted gold.

NEVADA LAND AND MINING COMPANY.—The Reno Crescent of May 22, under the head of the English Mill, says—"We understand this fine mill is now running to its full capacity, and is likely to for an indefinite time to come. Mr. Daune, we believe, has secured for the company an interest in the Alpha Mine, Humboldt, which secures to the mill plenty of ore for the future. The railroad (so far as freighting rock is concerned) brings the ores near the railroad in Humboldt county, as near Reno as Dalls Mill is to Virginia City. Wait about one year more, and we shall see where the best town on the railroad is. If there are then 100 stamps pounding in this neighbourhood, and a young Swansea started also, it will be but carrying out present intentions."

ALMADA SILVER.—Extract from a letter from Mr. H. Fitzhugh to Mr. J. A. Morgan:—Banking House of Soutter and Co., William-street, New York, May 17:—I have a letter from Mr. Willard, dated at Guaymas, April 15; and, in reply to a telegram from me announcing Mr. Power's intention to go to Mexico at once, stating that Mr. Power will be put in possession of the Almada property on his arrival; and in accordance with the contract made with me Mr. Willard briefly confirms former and recent favourable accounts from the mines.

ANGLO-ARGENTINE.—Mr. Barnard (San Juan, April 23) writes—A few lines from Capt. Vivian, dated four days ago, mentions everything as going on satisfactorily at the Guallian Mines.

IMPERIAL SILVER QUARRIES.—May 24: Eighteen feet of tunnel were made last week. The ground now has got so unsafe as to require close timbering. But for this circumstance, and that I had to go back and timber last week's running, I should have been able to report more tunnel. The porphyry has not yet crossed the entire face. Last week we ran between the porphyry and the lava, divided by a seam of a talcose nature, broken up by strata of obsidian, which, true to its place above, as shown on my last sketch, at the rear of F.F., underlies the lava below, the last-named formation, as demonstrated by the tunnel, pitching west at an angle of about 65°. As before stated, the selvage between the lava and porphyry was cut at the 872½. Owing to the strike of the lava, as shown in the tunnel, my running in porphyry may be longer than I expected.

PESTARENA UNITED.—Thos. Roberts, Jas. Mitchell, June 9: Val Toppa Mine: At No. 2, or Fisher's, level in the end, south from the third or inside cross-cut, on the new lode, we have apparently a large course of auriferous quartz, with strings of pyrites through it, which gives an average of 8 dwts. of gold per ton. We have already cut into it 3 ft. west, and in this direction we expect to reach a more important point. The end north, on the new lode, is not looking quite so well as when last reported on; this we anticipate is only temporary. The lode in the winze and in the stopes on this lode continues good. No change to notice in any other part of the mine.—Pestarena, Peschiera: The stopes in bottom of the 70 have improved a little in value, worth now 1½ oz. of gold per ton. The end north, in this end, continues to promise well. The winze sinking from the boundary stopes yields now 3 tons of ore per fathom. We shall make a trial of this ore in the present week, and give more particulars in our next.—Aquavite: The 23 south works more promising, and the 23 north yields 3 tons per fathom, worth 15 dwts. of gold per ton; and the 33 south continues the same as last week. The new stopes, in the back of this level, yield 5 tons per fathom, worth 2 ozs. of gold per ton.

[For remainder of Foreign Mines, see this day's Journal.)

AUSTRALIAN MINES.

YUDANAMUTANA COPPER.—**The superintendent (Adelaide, April 26) states, with regard to the Port Augusta Railway, that this work, which is of such immense importance to our company, is in a fair way towards accomplishment. During my stay at Blinman we succeeded in running, in three weeks, 34 tons 2 cwts., and our last advices for week ending April 17 give 12 tons 16 cwts. as the week's work. During my stay I made several alterations for the more economic working of the mine; and, as we are getting overstocked with wood, I have posted notices at the works stopping delivery until June 1, at which date I hope to let large contracts at, say, 10s. or 11s. per ton. With regard to the general appearance of the mine, I may refer you to the captain's report. My impression is that we may expect soon to come upon a large deposit. All the leaders and veins are dipping in one direction—west by north—and the appearance of these branches quite warrants the supposition that they are converging towards a bunch not far off. I enclose a sample of ore taken from the No. 1 winze, at the 45 fathom level—our deepest level—with Mr. James's assay of it, giving 50¼ per cent. The leader from which it was taken is about 2 feet wide. The north end of No. 3 winze is looking exceedingly well. The sales since last advices produced net 3341*l.* 11*s.* 1*d.* In conclusion, I may say that in every respect our prospects are at this time most encouraging, and that the mine never looked better. Capt. Terrell (April 19) reports—Blinman Mine, No. 1 Winze: The lode in the bottom is just the same as it has been for the last two or three months. In No. 3 winze I have put a pair of men to drive south of the 25 fm. level; the lode is from 6 ft. to 8 ft. wide, of good smelting work. The stopes in the back of the 25, north of No. 2 shaft, and those south of No. 1 winze, and in the Big Bunch, are looking just the same as last report. The lode in No. 1 winze continuing to go down strengthens my opinion that the mine will be richer at a deeper level. The returns for month ending March 31 are:—Ore raised 416 tons, smelted 416 tons; copper made, 43 tons 10 cwts.; copper dispatched to Port Augusta, 43 tons 18 cwts. 2 qrs.; on hand, 1 ton 13 cwts. We fortunately have had an abundance of rain, which has made feed plentiful, and the carters are now bringing in sufficient wood at the reduced rates. We have a good season before us, and everything going on well.**

PORT PHILLIP AND COLONIAL GOLD.—Mr. Bland, Clunes, April 22: The quantity of quartz crushed during the four weeks of March was 4506 tons, yielding 1941 ozs. 17 dwts. of gold, or an average of 8 dwts. 14 grs. per ton. The receipts were 7601*l.* 16*s.* 9*d.* Payments (including 1337*l.* 16*s.* 10*d.* paid on account of firewood and timber contracts), 5837*l.* 10*s.* 6*d.* Profit, 1764*l.* 6*s.* 3*d.*, added to which was last month's balance of 1255*l.* 14*s.* 3*d.*, thereby making an available balance of 3020*l.* 0*s.* 6*d.* The amount divided between the two companies was 2500*l.*, the Port Phillip Company's proportion being 1625*l.* The balance of the sum of 520*l.* 0*s.* 6*d.* was carried forward to next month's account against an estimated balance of 170*l.* due on firewood and timber contracts. The return for the first two weeks of April is as follows:—Quartz crushed, 2565 tons; gold obtained, 904 ozs. 10 dwts., or an average of 7 dwts. 1 gr. per ton. Remittances, 1745*l.* 9*s.* 1*d.*

WORTHING.—T. Priske, April 22: Bremer Mine: The shaftmen have nearly finished the plat at the 93. So soon as that is done we shall commence for the cistern and bearers, so that by the end of this month we shall have got through with most of our work in fixing the plunger at the 93. In addition to the above work the shaftmen are driving a cross-cut west towards the lode, which is now in between 2 and 3 fms. By the time the pitwork is finished we hope to be not far off the lode. In the 83 fathom level north end the lode at present is small and poor, but I think this is owing to meeting with a small cross-course, which I think will heave the lode a little to the west, which is common in this level, and generally changes the lode for the better. This we shall not be able to prove until we hole the rise, the air being so bad that we are obliged to stop the end until that is done, which we hope will be sometime in this month. The lode in the rise is about the same as last reported: Ground risen during the month 6 ft. 1 in. We have met with the lode in the 73 south in driving on the slide. I cannot say much about its productiveness until we get a little way from the slide. All that I can say is it is a large dredgy lode, and has let down all the water from the 53 south, and also nearly all from the 63 south, so that it looks promising for a good lode ahead. The lode in the 53 winze, north of engine-shaft, is not so good as last month; the ground is about th same; we have about 8 ft. to sink to hole to the rise. So soon as this is done it will give us air to go on working the north end of the mine: Ground sunk during the month 11 ft. 4 in.; present price for sinking 30*l.* per fm. We have commenced to sink two winzes in the bottom of the 53 south; the lode in one of them is good; in the other it is dredgy, but this we hope will soon improve. Our stopes in the back of the 63 are getting very near done, but produce about the same for ore. The 73 stope is also getting thin, but is about the same as usual for ore. The 83 stopes are about as usual, except what has been taken away. The quantity of ore raised during the month is 160 tons of the usual quality. Number of hands employed on the mine, 129. In the month past we have refixed the capstan, and put on the new wire-rope, which answers well. Most of our machinery is in good working order, and works well.

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated April 21. The sales of coal for March amounted to 13,733 tons.

ENGLISH AND AUSTRALIAN COPPER.—The directors have advices from their sub-manager, dated, Port Adelaide, April 26. The returns of fuel have not come forward *via* Marseilles, but are expected *via* Southampton. There were 250 tons of copper ready for shipment.

AUSTRALIAN UNITED.—Mr. Kitto (April 24) writes—Duke of Cornwall Mine: No fresh discoveries have been made since my last report. The workings of the old shaft and those of Daukes's have been connected by means of a winze sunk from the bottom level of the old shaft to that of Daukes's; the result is the thorough ventilation of the mine. The pumps will be connected with the engine in one week from this date, when sinking will be resumed. I have purchased at a sale sundry light railway iron for my surface and underground tramways, at an average cost of less than 6*l.* per ton; together with 32 iron trucks, &c., equally cheap. Also two cast-iron puddling-machines for the Central Mine, which will cost me less than 100*l.* each on the mine. The said machines, if ordered from the iron founders, would have cost 350*l.* each.—Central Mine: Immediately the pumps are at work at the Duke of Cornwall I shall instruct Mr. Rowe to erect the engine at this mine, as the loadings are ready to receive it.—Mr. Lamb, under the same date, also writes—I have pleasure in informing you that our neighbours are doing well in their mines, and that my confidence is unabated in our venture, and I think we shall create a sensation when fully in work.

Meetings of Mining Companies.

ST. JOHN DEL REY MINING COMPANY.

The annual general meeting of shareholders will be held at the London Tavern, Bishopsgate, on Wednesday next, when the report of the directors will be submitted.

To carry out the determination to re-open the Bahu and Cachoeira Mines, by means of two vertical shafts, the first of which was commenced on Oct. 9, the second shaft was commenced on Nov. 9, and from that date the sinking has been carried on uninterruptedly day and night in both shafts. The ground proved jointy and unfavourable for sinking for the first 12 or 13 fms., after which it became harder and more compact, and, therefore, more easily quarried. Should firm rock be met with in future the expense and delay of lining the shafts, which in the upper part has been necessary, will probably be avoided. An adit has also been commenced, which, being brought up from the lowest attainable level (a distance of 72 fms.), will strike the pumping-shaft 10 fms. below its mouth, so as to avoid lifting the water that height. This adit is now being driven at three points, to hasten its completion. Cross-cuts between the shafts, to create ventilation, and which will be otherwise useful, are also in progress. The progress made in these works up to the end of April was as follows:—The A or pumping shaft had been sunk 22 fathoms. The B or hauling shaft had been sunk 18 fathoms. The adit had been driven 12 fms. 1 foot. One cross-cut has been completed between the two shafts, length 4 fms. 5 feet. Two horse-whims had been erected, and were in use, for temporarily raising the debris and water from the shafts, and the necessary work had been commenced preparatory to removing the permanent pumping-wheel. This rate of progress, it will be observed, has given an average of 3 fms. 2 ft. per month in each shaft, but as during the first four months the ground was unfavourable, the shafts had to be close timbered, and, the whims not having been erected, the debris and water had to be raised by the slow process of windlasses. It is confidently expected that the progress in future will be more rapid.

The average cost of the work in hand for re-opening the mines by means of these vertical shafts, including sinking, lining the shafts, hauling the debris and water, driving the cross-cut and adit, and all surface work up to the end of March, has been 129*l.* per fathom sunk in each shaft. Mr. Sopwith has furnished the directors with an estimate of the cost of the whole work, which puts the cost of sinking the shafts (together 355 fms.), driving the cross-cuts, timbering, dividing, pitwork (pumps), fitting up, with every requisite for hauling 300 tons of ore per diem, with all labour and materials, at 33,117*l.*, and surface works (tunneling and machinery) at 13,062*l.*=46,179*l.* The produce of gold at Morro Velho and at Gaia from March 22, 1868, to March 22, 1869, has been—Morro Velho, 113,507 oits.; Gaia, 17,839 oits.=131,376 oits., being an average monthly produce of 9459 oits., or 1090·469 ozs. troy, from Morro Velho, and 1489 oits., or 161·657 ozs. troy, from Gaia. It will be seen that this average was exceeded during the two first months of 1869. The amount of expenditure over receipts on the Morro Velho estate during the year was 11,809*l.* 11*s.* 7*d.* There has been a profit on working the Fernam Paes estate, after payment of all cost, whether ordinary working cost, or outlay on account of plant, &c., of 878*l.* 8*s.* 4*d.*, leaving the loss for the year on the operations on both estates 10,931*l.* 3*s.* 3*d.* The outlay on the new shafts to the end of February, in addition to this, amounts to 3319*l.* 8*s.* 4*d.*

To meet this outlay on new shafts, and the future monthly outlay on this account, it will be necessary to place at the disposal of the directors such portion of the reserved fund as may be required; to this effect a resolution will be proposed to the meeting. In regard to the above loss on the general working, and with reference to what was stated in the last annual report of the directors in regard to bringing the expenses at the earliest possible date within the income, the directors have not failed to keep this object steadily in view, and to urge it constantly on the superintendent. Mr. Gordon, on his part, it is bare justice to state, has most earnestly carried out their views in this respect; and, in order to show what has been done, it may be mentioned that of the 59,317*l.* shown in the account above referred to as the expenditure of the year, 35,574*l.* was the amount expended in the first six months, and 23,743*l.* only in the second six months. Of the 35,574*l.* expended in the first half of the year, about 5500*l.* was (as stated in the last half-yearly report) for timber, stores, and the duty thereon, contracted for and bought previous to the fire, but not used, leaving the net expenditure at 30,074*l.* for the first six months, against 23,743*l.* for the second half of the year. The gold sold during the two halves of the year produced (net) 22,551*l.* in the first half, and 21,705*l.* in the second, leaving the difference between the expenditure and income during the last half of the year at 2038*l.* If a moiety of "gain or exchanges" be deducted therefrom, this adverse balance will be reduced to 316*l.*

	Per ton. Oits.	Dwts.	Grs.
The average standard or yield of the mineral reduced at the General stamps for the year ending Dec. 31 has been.....	1·368	or 3	3·6
The mineral from the Gamba Mine gave	1·972	or 4	13·1
Giving an average from the stamps of	1·444	or 3	7·9
The arrastres gave in addition.....	·115	or 0	6·3
And further re-grinding and re-stamping at the Praia.....	·167	or 0	9·3
Total average yield of mineral stamped at Morro Velho	1·726	or 3	23·5

The conditions under which the above results were obtained have been so exceptional, and so wholly dissimilar to any previous year, no part of the main lode being accessible, that it is unnecessary to quote the results of preceding years in comparison. The mean loss of gold in treatment at the Morro Velho stamps and arrastres during the year was about 0·936 oits. per ton, or 2 dwts. 3·8 grs. per ton. A check on this mode of ascertaining the loss has been established for some years by assays of the residuary sand as it leaves the inclined tables or strakes. The near approximation of the results of these different and independent modes of ascertaining the gold contents of the waste gives confidence in their accuracy, and that the actual average loss is, as nearly as it is possible to ascertain it, as above stated.

The daily average number of hands employed in the mine department during 1868 has been 594; the daily average number during 1867 was 860. The daily average number of borers during 1868 has been 161; the daily average number during 1867 was 267. The following table shows the quantity of mineral raised the cost, and the produce for the last three years:—

	Tons raised.	Cost.	Produce.
1868	50,545	£ 59,317	£ 44,256
1867	98,905	116,607	163,855
1866	107,087	134,516	243,923

The cost of the year now reported on, it will be observed, bears about the same proportion to the cost of the preceding year as to the quantity of mineral raised from the mines does to the quantity raised in the preceding year; or, in other words, the ton of mineral has cost as much to quarry and treat in 1868 as in 1867, which was much below that of preceding years. Considering the changed character of the work, that the Gamba Mine has been re-opened, for which purpose a large amount of new machinery was requisite, and that the quarrying at the several stations in the Bahu and Cachoeira has been attended with much expense on account of the quantity of new timberwork that was necessary, this result cannot but be considered satisfactory. The operations in each department have been carried on with energy and perseverance under very trying circumstances. A large amount of work has been got through by a greatly reduced number of officers and of European and other skilled labourers.

On the Fernam Paes estate the Gaia stamping mill of 24 heads was completed early in the year, and has been kept at work steadily since. The quantity of mineral stamped at this mill averaged about 810 tons a month during the last eight months of 1868. In January and February, 1869, it amounted to 860 and 856 tons respectively. The assay contents of the mineral stamped at the Gaia mill during the above-named eight months of 1868 was 3·557 oits., or 8 dwts. 4·8 grs. per ton, of which 2·035 oits., or 4 dwts. 16·6 grs. per ton were recovered, leaving the loss at 1·532 oits., or 3 dwts. 12·7 grs. per ton, being one-third more than the loss at the Morro Velho stamps. The progressive operations at the Gaia Mine were interrupted in October by the falling into the mine which was being opened out of a large quantity of loose ground from an old excavation made by former proprietors, the extent of which was unknown. The first attempt to secure this ground failed, in consequence of the soft, clayey nature of the bed of the excavation; a second mode is now in successful progress. When completed a supply of mineral of a better quality may be expected.

The investigation into the cause of the fire by the Chief of Police of the province has been entered on by that high officer, but owing to his having been called to the capital of the province in consequence of a change of presidents, the enquiry had been interrupted. He had, however, promised to return and complete the investigation at the earliest possible date.

The expenditure for March and April is provided for by the proceeds of 9000*l.* drafts negociated since March 1. The amount of stores (materials) in stock on Feb. 28 are of the value of 26,125*l.* The reserved fund at present amounts to the sum of 49,985*l.* 15*s.* 1*d.*

[For remainder of Meetings see to-day's Journal.]

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